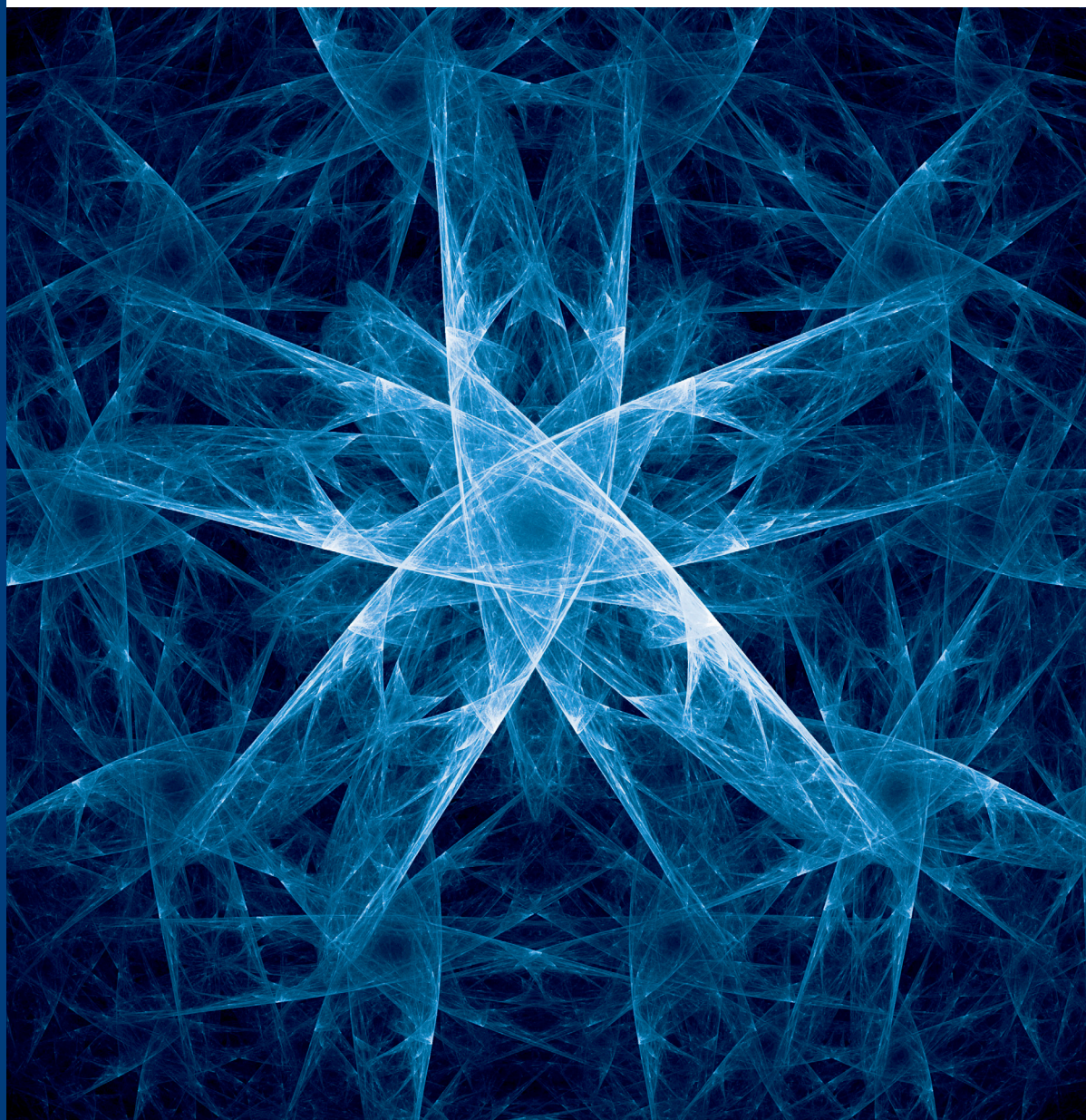
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5216.0

# Australian System of National Accounts

## Concepts, Sources and Methods

Australia 2012
Edition 3



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## Australia

## 2012

## Edition 3

**5216.0**

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## PREFACE

This publication is a guide to the Australian System of National Accounts. It outlines the major concepts and definitions, describes the data sources and methods used to prepare the estimates, and discusses the accuracy and reliability of the national accounts. It is particularly designed for use by those regularly using the accounts, such as economic and financial analysts. It is also intended as a reference for others who make use of the accounts less frequently, such as students of economics. The material is designed to enable users to appreciate and more readily assess the significance, accuracy and reliability of national accounting concepts and estimates.

This is the third edition of 5216.0 to be published in 2012. The first edition was published in July 2012 and reflected the implementation of 2008 SNA, BPM6 and ANZSIC06 with statistics published in *Australian System of National Accounts, 2010-11* (cat. no. 5204.0), the September quarter 2011 issue of *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0), the *Australian National Accounts: State Accounts 2010-11* (cat. no. 5220.0) and the September quarter 2011 issue of *Financial Accounts* (cat. no. 5232.0).

The second edition was published in September 2012 and included the chapter on the concepts, sources and methods that underpin the Australian Input-Output tables. This is consistent with the ABS publications *Australian National Accounts: Input-Output Tables Electronic Publication* (cat. no. 5209.0.55.001) and the *Australian National Accounts: Input-Output Tables (Product Details) Electronic Publication* (cat. no. 5215.0.55.001).

This edition includes five additional chapters covering:

- productivity measures – consistent with the ABS publications *Australian System of National Accounts, 2011-12* (cat. no. 5204.0) and the *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0);
- analytical measures – consistent with the ABS publications *Australian System of National Accounts, 2011-12* (cat. no. 5204.0) and the *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0);
- state accounts – consistent with the ABS publication *Australian National Accounts: State Accounts 2011-12* (cat. no. 5220.0);
- satellite and environmental-economic accounts; and
- the quality of the national accounts.

Two additional appendices have been included. The first addresses the current issue of measuring 'beyond GDP' and ABS initiatives to meet this demand. The second appendix outlines the issues of the non-observed economy within the Australian context.

The chapters released in the first edition have been updated to reflect changes made to the sources and methods used to compile the ABS publications *Australian System of National Accounts, 2011-12* (cat. no. 5204.0), the September quarter 2012 issue of *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) and the September quarter 2012 issue of *Financial Accounts* (cat. no. 5232.0).

Brian Pink
Australian Statistician

# CHAPTER 1 INTRODUCTION

## INTRODUCTION

1.1. The Australian System of National Accounts (ASNA) is based on the international standard, the *System of National Accounts, 2008* (2008 SNA). The previous printed version of the *Australian System of National Accounts: Concepts, Sources and Methods* (cat. no. 5216.0) was published in 2000. At that time the accounts were based on the *System of National Accounts, 1993* (1993 SNA). The changes between the 1993 SNA and the 2008 SNA were less extensive than the changes introduced in the 1993 SNA. The 2008 SNA changes were necessary as the economic environment had evolved significantly since the early 1990s and there have been improved methods of measuring some of the more difficult components of the accounts in that time. The 2008 SNA does not recommend fundamental structural or comprehensive changes, and it ensures further consistency with related manuals, such as the *Balance of Payments and International Investment Position Manual sixth edition* (BPM6) which was updated simultaneously with the 2008 SNA. It is expected that Australia's Government Finance Statistics (GFS) will be updated to align with the revised International Monetary Fund's *Government Finance Statistics Manual* (GFSM) due for release in 2012.

1.2. The ASNA has been revised to reflect the implementation of the 2008 SNA, and consequently the BPM6. The main changes are the capitalisation of both research and development expenditure and weapons systems; and the inclusion of reinvested earnings of investment funds. In addition, there has been the implementation of two key changes that were recommended in 1993 SNA but not implemented, namely the inclusion of orchard growth in the capital and production accounts and moving financial auxiliaries to the financial corporations sector.

1.3. Another significant change that was introduced with the 2008 SNA and BPM6 was a revision of the Australian and New Zealand Standard Industrial Classification (ANZSIC). The ANZSIC was revised in 2006 (ANZSIC06), and its introduction into the ASNA coincided with the implementation of the revised international standards.

1.4. The 2008 SNA, BPM6 and ANZSIC06 changes were first introduced in the *Australian System of National Accounts 2008-09* (cat. no. 5204.0), the September quarter 2009 issue of *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0), the *Australian National Accounts: State Accounts 2008-09* (cat. no. 5220.0) and the September quarter 2009 issue of *Financial Accounts* (cat. no. 5232.0).

1.5. Although balance of payments and government finance statistics are an integral part of the Australian National Accounts, a description of concepts and data sources used for these statistics is included only for those aggregates that appear in the national accounts. For a more detailed description of balance of payments statistics see *Balance of Payments and International Investment Positions, Australia: Concepts, Sources and Methods* (cat. no. 5331.0) and government finance statistics see *Australian System of Government Finance Statistics: Concepts, Sources and Methods, 2005* (cat. no. 5514.0).

## NATURE, PURPOSE AND HISTORY OF NATIONAL ACCOUNTS

### Nature and purpose of national accounts

1.6. National accounts provide a systematic statistical framework for summarising and analysing economic events, the wealth of an economy, and its components. Historically, the principal economic events recorded in the national accounts have been production, consumption, and accumulation of wealth. National accounts have also recorded the income generated by production, the distribution of income among the factors of production and the use of the income, either for consumption or acquisition of assets. The modern accounts additionally record the value of the economy's stock of assets and liabilities, and record the events, unrelated to production and consumption, that bring about changes in the value of the wealth stock. Such events can include revaluations, write-offs, growth and depletion of natural assets, catastrophes, and transfers of natural assets to economic activity.

1.7. The national accounting framework has always consisted of a set of accounts that are balanced using the principles of double entry accounting. However, the accounts are now fully integrated in that there is a balance between the value of assets and liabilities at the beginning of an accounting period, the transactions and other

economic events that occur during the accounting period, and the closing values of assets and liabilities. Accounts for the economy as a whole are supported by accounts for the various sectors of the economy, such as those relating to the government, households and corporate entities. The framework also embraces other, more detailed, accounts such as financial accounts and input and output (I-O) tables, and provides for additional analyses through social accounting matrices and satellite accounts designed to reflect specific aspects of economic activity such as tourism, health and the environment. By applying suitable price measures, the national accounts can be presented in volume terms as well as in current prices. The time series of the national accounts can also be adjusted to remove seasonal distortions and to disclose trends.

1.8. National accounting information can serve many different purposes. In general terms, the main purpose of the national accounts is to provide information that is useful in economic analysis and formulation of macroeconomic policy. The economic performance and behaviour of an economy as a whole can be monitored using information recorded in the national accounts. National accounts data can be used to identify causal relationships between macroeconomic variables and can be incorporated in economic models that are used to test hypotheses and make forecasts about future economic conditions. Using national accounts data, analysts can gauge the impact of government policies on sectors of the economy, and the impact of external factors such as changes in the international economy. Economic targets can be formulated in terms of major national accounting variables, which can also be used as benchmarks for other economic performance measures, such as tax revenue as a proportion of gross domestic product or the contribution of government to national saving. Provided that the national accounts are compiled according to international standards, they can be used to compare the performance of the economies of different nations.

1.9. However, the full range of information available from a comprehensive national accounting system can serve purposes well beyond immediate concerns of macroeconomic analysts. For example, national accounts information can be used to analyse income and wealth distribution, financial and other markets, resource allocation, the incidence of taxes and welfare payments, environmental issues, productivity, industry performance, and so on. In fact, the range of analytical purposes that can be served by a complete system of national accounts has no well-defined limits, and the body of national accounts data can be seen as a multi-purpose data base that can be used with a high degree of flexibility.

1.10. Surveys and other statistical systems that employ the concepts in the national accounting framework will produce information that is consistent with the national accounts and with other statistics that are based on the national accounts framework.

## Brief history of national accounts

1.11. The idea of estimating national income can be traced back to the seventeenth century. Interest in raising revenue and in assessing England's war potential led to attempts by Sir William Petty in 1665 and Gregory King in 1688 to estimate the national income as either the sum of factor incomes or the sum of expenditures. A little later, Boisguillebert and Vauban used a similar approach in estimating France's national income.

1.12. The eighteenth century French economists called the Physiocrats took a step backwards when they restricted the concept of national income by arguing that only agriculture and the extractive industries were productive. However, Quesnay, one of the Physiocrats, set out the interrelationships between the various activities in the economy in his *tableau economique*, published in 1758, which was the forerunner of the twentieth century work on I-O statistics.

1.13. Adam Smith, in his book the *Wealth of Nations*, rejected the Physiocrats' view of the pre-eminent position of agriculture, by recognising manufacturing as another productive activity. However, Smith and the early classical school of economists that he founded did not recognise the rendering of services as productive activity. Karl Marx was also of this view, and the notion persisted in the material product system of national accounts that was used, until recently, by the centrally planned economies[1].

1.14. Some English economists, in particular Ricardo and Marshall, further refined the concept of production and in the 1920s the welfare economists led by Pigou undertook the first effective measurement of national income.

1.15. The Great Depression of the 1930s, and the attempts by Keynes and others to explain what was happening to the world economy, led economists away from their preoccupation with national income as a single measure of economic welfare. Instead, they attempted to use the new Keynesian General Theory to develop a statistical model of the workings of the economy that could be used by government to develop prescriptions for a high and stable level of economic activity. By the end of the 1930s, the elements of a national accounting system were

[1] There is an international standard for material product balances: United Nations Statistical Office, *Basic Principles of the System of Balances of the National Economy*, Studies in Methods, Series F, No. 17, UN, New York, 1971.

in place in several countries. The models of Ragnar Frisch and Jan Tinbergen stand out in this period as path-breaking achievements.

1.16. The economic modelling task was given further impetus in the 1940s; first, by the need to efficiently run war-time economies; second, by the publication in 1941 of Wassily Leontief's classic I-O study *The Structure of the American Economy*; third, by the post-war acceptance by governments of full responsibility for national and international economic management; and last, by the League of Nations publication of an important report about social accounting. By the end of the decade, integrated statistical reporting systems and formal national accounting structures were in place in Australia, the United States, the United Kingdom, Canada, the Scandinavian countries, the Netherlands and France.

1.17. The need of international organisations for comparable data about the economies of member countries was one important factor that prompted development of international standards for national accounting in the late 1940s and early 1950s. The Organisation for European Economic Co-operation sponsored the work of Richard Stone's National Accounts Research Unit at Cambridge University, from which emerged the now-familiar summary accounts of the nation[2]. Then the United Nations Statistical Office convened its first expert group on the subject. It was also headed by Stone and, in 1953, produced the publication *A System of National Accounts and Supporting Tables* (SNA)[3], which described the first version of the system that has become the accepted world-wide standard for producing national accounts.

1.18. There were several other important developments in national accounting in the 1950s. M.A. Copeland and his colleagues in the United States Federal Reserve System prepared the first flow-of-funds tables, which analysed transactions in financial markets. A few countries increased the frequency of national accounts information by producing quarterly estimates of national income and expenditure (so that their governments could better monitor the business cycle) and also produced information classified by industry and institutional sector (to identify growth industries, poorly performing institutional sectors etc.).

1.19. National accounting's modern era could be said to have started in 1968. In that year, the United Nations Statistical Office published a fully revised version of the SNA, which drew together all the various threads of economic accounting: estimates of national income and expenditure (including estimates at constant prices); I-O production analysis; flow-of-funds financial analysis; and balance sheets of national wealth[4]. In 1977 the United Nations Statistical Office published detailed international guidelines on the compilation of balance sheet and reconciliation accounts within the SNA framework[5].

1.20. Since 1968, changes in the structure and nature of economies, the increasing sophistication and growth of financial markets and instruments, emphasis on the interaction of the economy with the environment and other considerations pointed to a need to update the SNA. The task of updating and revising the SNA was coordinated from the mid-1980s by the Inter-secretariat Working Group on National Accounts, working with the assistance of international organisations and experts from national statistical offices around the world. The Working Group consisted of the Commission of the European Communities (Eurostat), the International Monetary Fund (IMF), the Organisation for Economic Co-operation and Development (OECD), the United Nations (UN) and the World Bank. The resulting 1993 SNA was released under the auspices of those five organisations[6].

1.21. The 1993 SNA aimed to clarify and simplify the 1968 System, while updating the System to reflect new circumstances. The 1993 SNA fully integrated national income, expenditure and product accounts, I-O tables, financial flow accounts and national balance sheets to enable the examination of production relationships and their interaction with countries' net worth and financial positions. 1993 SNA also introduced the concept of satellite accounts to extend the analytical capacity of national accounts in areas such as tourism, health and the environment. It was one of a quartet of 'harmonised' international statistical standards that included the standards set out in the IMF publications *Balance of Payments Manual 1993 (fifth edition)* (BPM5), *Manual of Monetary and Financial Statistics* (MMFS), and *A Manual of Government Finance Statistics (second edition)* (GFS). In this context, 'harmonisation' means that the standards employ common concepts and definitions so that valid comparisons can be made of statistics produced from each of the four systems. However, because

[2] Office of European Economic Co-operation, *National Accounts Studies*, Paris, 1951-53; and Office of European Economic Co-operation, *A Standardized System of National Accounts*, Paris, 1952.
[3] United Nations, *A System of National Accounts and Supporting Tables*, Studies in Methods, Series F, No. 2, UN, New York, 1953.
[4] Statistical Office of the United Nations, *A System of National Accounts*, Studies in Methods, Series F, No. 2 Rev. 3, UN, New York, 1968.
[5] United Nations Statistical Office, *Provisional International Guidelines on the National and Sectoral Balance-sheet and Reconciliation Accounts of the System of National Accounts*, Statistical Papers, Series M, No. 60, UN, New York, 1977.
[6] Commission for the European Communities, International Monetary Fund, Organisation for Economic Co-operation and Development, United Nations and World Bank, *System of National Accounts 1993*, Brussels/Luxembourg, New York, Paris, Washington D.C., 1993.

each system serves different purposes, complete alignment of the standards was neither feasible nor necessary. Each system therefore had a proportion of unique concepts and definitions.

1.22. The 2008 SNA was commissioned by the United Nations Statistical Commission to bring the national accounting framework as outlined in the 1993 SNA into line with the needs of data users. It was considered that the economic environment in many countries has evolved significantly since the early 1990s and, in addition, methodological research had resulted in improved methods of measuring some of the more difficult components of the accounts. The 2008 SNA does not recommend fundamental or comprehensive changes. Further consistency with related manuals, such as those on the balance of payments (which was updated simultaneously with the 2008 SNA), on government finance statistics and on monetary and financial statistics, was an important consideration. Therefore there is more harmonisation between the 2008 SNA and related manuals. The key changes fell into five main groups: assets; the financial sector; globalisation and related issues; the general government (GG) and public sectors; and the informal sector. Australia's policy is to apply each of the standards to the highest feasible degree, a high level of harmonisation will be found between the Australian national accounts and Australia's balance of payments, government finance, and monetary and finance statistics.

## NATIONAL ACCOUNTS IN AUSTRALIA

1.23. Australia pioneered work on national wealth in 1890 when Coghlan (the New South Wales Government Statistician) prepared rudimentary balance sheets for New South Wales. However, it was not until almost sixty years later, at the Conference on Research in Income and Wealth in 1948, that national balance sheets again received serious international attention.

1.24. The first official estimates of national income for Australia (based on estimates prepared by Clark and Crawford) were published in 1938 in *The Australian Balance of Payments, 1928-29 to 1937-38,* although unofficial estimates by several economists had been published in the 1920s and 1930s[7]. In 1945, the first official set of national accounts was prepared by the then Commonwealth Bureau of Census and Statistics (CBCS) and published in the Commonwealth Budget Paper *Estimates of National Income and Public Authority Income and Expenditure.*

1.25. The 1960s and early 1970s were times of significant development for Australian national accounting. The first official quarterly estimates of national income and expenditure were published in December 1960[8]. In 1963 the CBCS published the first *Australian National Accounts: National Income and Expenditure* (ANA) bulletin, which included the first annual constant price estimates for Australia[9]. Experimental I-O estimates were published in 1964[10]. The CBCS began to seasonally adjust its quarterly estimates of national income and expenditure in 1967. Estimates of gross product by industry at constant prices were published for the first time in 1969[11]. In 1971, the CBCS first published seasonally adjusted, constant price quarterly estimates of national income and expenditure, which later proved to be among the most used of all national accounting estimates. The CBCS published estimates of national income and expenditure based on the revised SNA (1968 version) in 1973, and also published the first official I-O statistics[12] in the same year.

1.26. In the 1980s, the former CBCS, now called the Australian Bureau of Statistics (ABS), again made significant progress in national accounting. The first full edition of *Australian National Accounts: Concepts, Sources and Methods* was published in 1981 at about the same time as the first experimental estimates of capital stock[13]. The ABS conducted a study into the accuracy and reliability of the quarterly estimates of national income and expenditure and published the results in 1982[14]. Experimental State accounts[15] were published in 1984, followed

[7] Clark, Colin & Crawford J.G., *The National Income of Australia,* Angus and Robertson, Sydney, 1938; Commonwealth Bureau of Census and Statistics, *The Australian Balance of Payments,* 1928-29 to 1937-38, AGPS, Canberra, 1938; the earlier unofficial estimates are discussed in N.G. Butlin, *Australian Domestic Product, Investment and Foreign Borrowing,* 1861 to 1938-39, Cambridge, 1962, Ch. 2.
[8] Commonwealth Bureau of Census and Statistics, *Quarterly Estimates of National Income and Expenditure,* CBCS, Canberra, 1960.
[9] Commonwealth Bureau of Census and Statistics, *Australian National Accounts: National Income and Expenditure, 1948-49 to 1961-62*, CBCS, Canberra, 1963.
[10] Commonwealth Bureau of Census and Statistics, *Australian Input-Output Tables, 1958-59,* CBCS, Canberra, 1964.
[11] Commonwealth Bureau of Census and Statistics, *Estimates of Gross Product by Industry at Current and Constant Prices, 1959-60 to 1965-66*, CBCS, Canberra, 1969.
[12] Commonwealth Bureau of Census and Statistics, *Australian National Accounts: Input-Output Tables, 1962-63,* CBCS, Canberra, 1973.
[13] Bailey, Cherylee, *Studies in National Accounting: Current-cost and Constant-cost Depreciation and Net Capital Stock,* ABS, Canberra 1981.
[14] Johnson A.G. , *The Accuracy and Reliability of the Quarterly Australian National Accounts,* ABS, Canberra, 1982.
[15] Burrell S. , Daniel J. , Johnson A. and Walters R. , *State Accounts, Australia: Issues and Experimental Estimates,* ABS, Canberra, 1984.

by the first official estimates in 1987[16]. They are now published annually in *Australian National Accounts: State Accounts (cat. no. 5220.0).* In 1985, the ABS published an assessment of the effects of rebasing constant price estimates from a 1979-80 base to a 1984-85 base[17]. In 1986, the second set of experimental estimates of capital stock was published[18] followed in 1987 by the first official estimates of capital stock[19]. The first quarterly estimates of constant price gross product by industry were released in 1988[20]. These estimates were subsequently incorporated into the quarterly *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0).

1.27. Further significant developments in national accounting and associated statistics occurred during the 1990s. An updated edition of *Australian National Accounts: Concepts, Sources and Methods* was published in 1990 (subsequently available on CD-ROM), the same year as the first estimates of multifactor productivity were published[21]. In 1990, the ABS also published developmental flow of funds accounts, showing the changes in financial assets and liabilities arising from the financing of productive activity in the economy[22]. Flow of funds estimates are now published on a quarterly basis, along with estimates of stocks of financial assets and liabilities at the end of each quarter. An Information Paper describing the impact of rebasing constant price estimates from a 1984-85 base to a 1989-90 base was published in 1993[23]. Experimental estimates of national balance sheets for Australia were first released in 1995[24], followed by the publication of regular annual national and sector balance sheet estimates in 1997. Supply and Use (S-U) tables were introduced in the annual national accounts in 1998, in conjunction with the implementation of 1993 SNA, as an integral part of the annual compilation of Gross Domestic Product (GDP). They ensure GDP is balanced for all three approaches (production, expenditure and income) and provide the annual benchmarks from which the quarterly estimates are compiled.

1.28. The 1993 SNA was formally introduced into the national accounts in the September quarter 1998 issue of *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0), which was released in December 1998. Prior information on the nature and impact of implementation of the revised standards and methods was provided in a series of discussion and information papers as follows:

- Discussion Paper: *Introduction of Revised International Statistical Standards in ABS Macro-economic statistics* (cat. no. 5245.0), December, 1994.
- *Information Paper: Implementation of Revised International Standards in the Australian National Accounts* (cat. no. 5251.0), September, 1997.
- *Information Paper: Introduction of Chain Volume Measures in the Australian National Accounts* (cat. no. 5248.0), March, 1998.

1.29. Preliminary data on an 1993 SNA basis were made available in re-releases of the following publications:

- *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0), June quarter, 1998 re-released in November 1998 in *Information Paper: Upgraded Australian National Accounts* (cat. no. 5253.0).
- *Australian National Accounts: Financial Accounts* (cat. no. 5232.0), June quarter, 1998 re-released in December 1998 in *Information Paper: Upgraded Australian National Accounts: Financial Accounts* (cat. no. 5254.0).

1.30. The first annual national accounts publication on a 1993 SNA basis was *Australian System of National Accounts, 1997-98* (cat. no. 5204.0), which was released in April 1999. This publication provided comprehensive national and sectoral accounts, including balance sheets, as well as estimates of capital stock and multifactor productivity.

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[16] Australian Bureau of Statistics, *Australian National Accounts: State Accounts, 1985-86,* ABS, Canberra, 1987.
[17] Dippelsman R.J. , *The Effects of Rebasing the Constant Price Estimates of the Australian National Accounts,* ABS, Canberra, 1985.
[18] Walters R. and Dippelsman R. , *Estimates of Depreciation and Capital Stock, Australia,* ABS, Canberra 1986.
[19] Australian Bureau of Statistics, *Australian National Accounts: Estimates of Capital Stock, 1985-86,* ABS, Canberra, 1987.
[20] Australian Bureau of Statistics, *Australian National Accounts: Gross Product, Employment and Hours Worked,* June Quarter 1988, ABS, Canberra, 1988.
[21] Australian Bureau of Statistics, *Occasional Paper: Estimates of Multifactor Productivity, Australia,* ABS, Canberra, 1990.
[22] Australian Bureau of Statistics, *Information Paper: Australian National Accounts: Flow of Funds Developmental Estimates,* ABS, Canberra, 1990.
[23] Australian Bureau of Statistics, *Information Paper: Australian National Accounts: Introduction of Constant Price Estimates at Average 1989-90 Prices,* ABS, Canberra, 1993.
[24] Australian Bureau of Statistics, *Occasional Paper: National Balance Sheets for Australia: Issues and Experimental Estimates, 1989 to 1992,* ABS, Canberra, 1995.

A significantly updated edition of *Australian National Accounts: Concepts, Sources and Methods* was published in 2000. It outlined the implementation of the 1993 SNA in the national accounts statistics of Australia.

1.31. There were major changes to the Australian tax system from 1 July 2000 with the introduction of The New Tax System (TNTS). A major feature of the new arrangements was the introduction of a goods and services tax (GST), which affected the prices of a broad range of goods and services in the economy. The GST replaced wholesale sales taxes (WST) and a number of other taxes on production and imports, although not all of these taxes were abolished from 1 July 2000. The introduction of the GST was accompanied by reductions in personal income tax rates and increases in social security payments. There were also changes to company tax arrangements. The information paper *ABS Statistics and The New Tax* System (cat. no. 1358.0) and the feature article in the March quarter 2000 *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) provide more detail on the impact of this change. The TNTS was introduced into the national accounts in the September quarter 2000 issue of *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) and 2000-01 issue of the *Australian System of National Accounts* (cat. no. 5204.0).

1.32. The first *Australian National Accounts: Tourism Satellite Account, 1997-98* (cat. no. 5249.0) was published in 2000 on a pre-GST basis and post-GST from 2002 annually. There have been other satellite accounts published occasionally, namely the *Australian National Accounts: Non-Profit Institutions Satellite Account* (cat. no. 5256.0) in 2002 and 2009 and the *Australian National Accounts: Information and Communication Technology Satellite Account* (cat. no. 5259.0) in 2006.

1.33. A significant development in state accounts occurred in 2007 with the estimation of Gross State Product using the production approach (GSP(P)). Consequently, the headline measure of GSP was the average of the existing GSP estimated using the income/expenditure approach and GSP(P). The first estimates were released in *Australian National Accounts State Accounts, 2006-07* (cat. no. 5220.0). The information paper *Gross State Product using the Production Approach GSP(P)* (cat. no. 5220.0.55.002) outlined the methods and sources for estimating GSP(P).

1.34. In February 2012, the System of Environmental and Economic Accounting (SEEA) was elevated as an international statistical standard. Additional parts to the SEEA, namely applications and ecosystems, are still in development. This development process occurred over many years and the ABS was, and will continue to be, at the forefront of the international efforts. Crucially, the SEEA is fully integrated with SNA concepts and therefore provides harmonised information across the environment and economic domains. Where necessary, environmental accounting can extend the asset and production boundaries of the SNA framework to better encapsulate the environment and its resources. The ABS releases a range of annual accounts including *Water Account, Australia* (cat. no. 4610.0) and *Energy Account, Australia* (cat. no. 4604.0). Land accounts for selected regions of Australia are under development, and there are plans to release Environmental Protection Expenditure Accounts and Waste Accounts in the near future.

1.35. The 2008 SNA was formally introduced into the national accounts in the September quarter 2009 issue of *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) and the annual release of *Australian System of National Accounts,* 2008-09 (cat. no. 5204.0), which were released in December 2009. Prior information on the nature and impact of implementation of the revised standards and methods was provided in the following information papers:

- *Information Paper: Introduction of revised international standards in ABS economic statistics in 2009, 2007* (cat. no. 5310.0.55.001), September, 2007
- *Information Paper: Implementation of new international standards in ABS National and International Accounts in September 2009* (cat. no. 5310.0.55.002), October, 2007

1.36. The standards set out in the 2008 SNA (as well as 1993 SNA) are designed to be applied with a degree of flexibility, and Australia's implementation of the standards reflect local conditions and requirements. Furthermore, decisions are made in isolated instances to depart from the standards because of strong user preference for an alternative view and such departures are noted at appropriate points throughout this manual. The departures are relatively minor and, consequently, they do not affect the comparability of national accounts information reported by the ABS to international organisations such as the UN and the OECD to a significant extent. A list of the main departures from 2008 SNA is provided in Appendix 2.

## PURPOSE OF CONCEPTS, SOURCES AND METHODS

1.37. The main purpose of this manual is to provide users with an in-depth understanding of the national accounts statistics as an aid to more effective use and interpretation of the statistics. A detailed understanding of the underlying statistical standards and concepts, and of the methods used to compile the statistics, should enable

users to make better judgements about the economic significance, quality and accuracy of the statistics. To achieve this aim, this manual provides an updated account of the concepts, sources and methods used to compile the Australian national accounts statistics. A number of appendices are also included to provide additional information on particular aspects of national accounting, such as the classifications underlying the accounts.

1.38. A wide spectrum of audiences requires information about national accounts concepts, sources and methods. These range from users with broad, general needs for information about the main aggregates to those with highly specialised needs relating to particular data items. The main categories of users, and their likely needs, are set out below:

- students at upper high school level or undergraduate level at university - the need is for a broad understanding of the conceptual framework, how the numbers are put together, and the main outputs (publication tables, written and graphic analysis, and explanatory notes) to gain an appreciation of the current performance of the Australian economy;
- financial journalists - the need is for a broad understanding of the conceptual framework, how the numbers are put together, and the main outputs, to support media comment on the current performance of the Australian economy. These users may need to delve deeper on particular aspects;
- teachers/teaching academics - a broad understanding of the conceptual framework, how the numbers are put together, and the main outputs, to support teaching about Australia's economy. These users may also need to delve deeper on particular aspects;
- financial sector economists, economists working for interest groups, national and international investors, public sector economists in other countries, and international credit rating agencies - a reasonably detailed understanding of the conceptual framework, the sources and how the numbers are put together, to support their interpretation of the statistics and advice to their organisations and clients;
- international agencies such as the IMF, the OECD, the World Bank and the United Nations Statistics Division - generally these agencies require a reasonably detailed understanding of all aspects of the statistics. Their uses encompass monitoring the extent of country adherence to international standards and practices, the compilation of country groupings and world economic statistics, and modelling work to support the preparation of country reports;
- academic researchers - a reasonably detailed understanding of the conceptual framework, the sources, and how the numbers are put together, with more detail on particular accounts/items to support research and modelling;
- national accounts compilers in other countries - a reasonably detailed understanding of Australian sources and methods, with more detail on particular accounts/items, to compare with their own practices; and
- the Commonwealth Treasury, the Reserve Bank of Australia (RBA), the Productivity Commission and other public sector economists - a reasonably detailed understanding of Australian sources and methods to support their interpretation of the numbers and forecasting of national accounting aggregates.

1.39. For students and others who need only a broad understanding of the national accounts statistics, the ABS publication *Measuring Australia's Economy* (cat. no. 1360.0) provides a brief overview of the concepts, structure and classifications of these and the other major economic statistics published by the ABS. The present concepts, sources and methods document should prove a useful extension, but for the most part it may be too detailed for this audience.

1.40. The present document is aimed mainly at the user of national accounts statistics who is interested in the more detailed aspects. However, it is not a complete description of the ABS national accounts methodology. That task would require a much larger publication. This publication aims to provide a substantial guide to what the ABS does to compile national accounts statistics.

## THE AUSTRALIAN SYSTEM OF NATIONAL ACCOUNTS

### Scope of the Australian system of national accounts

1.41. The ASNA forms a body of statistics that incorporates a wide range of information about the Australian economy and its components. In addition to the long-standing statistics of national income, expenditure and product, the accounts include the financial accounts, I-O tables, balance sheet statistics (including capital stock statistics),

multifactor productivity statistics, state accounts, and satellite accounts. The ultimate scope of the ASNA encompasses the full range of statistics that the 2008 SNA recommends for a complete national accounting system. However, like most other countries, Australia does not yet compile the full range of information recommended in the 2008 SNA. The areas where the ABS is yet to implement the 2008 SNA recommendations are identified at relevant points throughout this manual and are summarised in Appendix 2, Differences between ASNA and 2008 SNA.

1.42. The current scope of the ASNA is best described by the list of statistical bulletins that comprise the ASNA data. These are as follows:

- *Australian System of National Accounts* (cat. no. 5204.0) - annual;
- *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) - quarterly;
- *Australian National Accounts: Input-Output Tables Electronic Publication* (cat. no. 5209.0.55.001) - annual;
- *Australian National Accounts: Input-Output Tables (Product Details) Electronic Publication* (cat. no. 5215.0.55.001) - annual;
- *Australian National Accounts: State Accounts* (cat. no. 5220.0) - annual;
- *Australian National Accounts: Financial Accounts* (cat. no. 5232.0) - quarterly;
- *Australian National Accounts: Tourism Satellite Accounts* (cat. no. 5249.0) - annual;
- *Australian National Accounts: Non-Profit Institutions Satellite Accounts* (cat. no. 5256.0) - irregular; and
- *Australian National Accounts: Information and Communication Technology Satellite Accounts* (cat. no. 5259.0) - irregular.

1.43. The data on capital stock, productivity and net worth that were formerly the subjects of three separate annual publications, namely *Australian National Accounts: Capital Stock* (cat. no. 5221.0), *Australian National Accounts: Multifactor Productivity* (cat. no. 5234.0) and *Australian National Accounts: National Balance Sheet* (cat. no. 5241.0) are included in cat. no. 5204.0.

1.44. In general terms, the information published in cat. nos 5204.0 and 5206.0 covers the economic transactions related to the economic functions of production, consumption and accumulation of wealth. The functions are recorded in a central set of accounts comprising a gross domestic product account, a national income account, a national capital account, a financial account and a balance sheet. Important economic variables such as gross domestic product, disposable income, final consumption expenditure, gross saving, net lending or borrowing and net worth are recorded in these accounts. Changes to the balance sheet values of financial assets and liabilities arising from events other than transactions (for example, write-offs and revaluations) are recorded in cat. no. 5204.0. Supporting accounts in these publications provide further breakdowns (for example, by institutional sector and industry) of the variables recorded in the central accounts.

1.45. The information published in cat. nos 5209.0.55.001 (Input-Output tables) and 5220.0 (State Accounts) can be described as further disaggregations of information included in cat. no. 5204.0. For example, in the central S-U table in cat. no. 5209.0.55.001, the economy's total supply of products is shown according to the industries that produced the products, and the use of products by each industry is recorded, as are the factor incomes generated by each industry. The information published in cat. no. 5220.0 provides a summary record for each Australian State and Territory of the production account published in cat. no. 5204.0.

1.46. Cat. no. 5232.0 (Financial Accounts) includes disaggregations of information published in cat. nos 5204.0 and 5206.0, but also includes disaggregations of balance sheet information for financial assets and liabilities. The financial accounts include flow of funds statistics, which provide sectoral capital accounts with the corresponding sectoral financial account. The financial accounts provide a breakdown (financial instrument cross-classified by counterparty sector) of transactions recorded in the financial account (counterparty sectors are the sectors with which the subject sector has undertaken the subject transactions). The financial accounts also record the value of financial assets and liabilities at the end of each quarter, broken down by instruments cross-classified by counterparty sector.

1.47. The satellite accounts published in cat. nos 5249.0 (Tourism), 5256.0 (Non-Profit Institutions) and 5259.0 (Information and Communication) present specific details on a particular topic (both in monetary and physical terms) in an account which is separate from, but linked to, the information published in 5204.0. Satellite accounts allow an expansion of the national accounts for selected areas of interest while maintaining the concepts and structures of the core national accounts. Implicitly data presented in satellite accounts are

included in the national accounts but they can go further and include data that is not in the national accounts at all.

1.48. In summary, the ASNA provides a record of Australia's economic wealth and the changes to that wealth brought about by economic activity. The Australian national accounts statistics are also disaggregated to provide information about economic assets and activities for sectors, industries, and products, and about different types of assets, liabilities, transactions and other economic events. In terms of economic information, the scope of the statistics is therefore very wide and the only economic activities omitted from that scope are those that fall outside the defined boundaries of production, consumption, accumulation and economic assets. Nevertheless, the ASNA does not necessarily provide all of the macroeconomic measures that analysts require, and statistical offices, including the ABS, are working to improve and extend the body of macroeconomic statistics.

## General nature of ASNA methodology

1.49. The sources and methods used to compile national accounts are typically many and varied, and the Australian situation is no exception. From the perspective of users of the ASNA, an understanding of the sources of information used and the methods applied to compile the national accounts is useful because such matters can influence the quality, accuracy and reliability of the statistics. A detailed account of the sources and methods underlying the data compiled for key variables in the central transaction accounts and for specific sets of data, such as appear in the financial accounts and the balance sheets, are outlined in other sections. The next few paragraphs provide a broad description of the processes and infrastructure that underlie compilation of the ASNA.

1.50. Because of the wide range of information included in the ASNA, capture of the data by means of a single survey, or even a few surveys, would not be feasible. Since many parts of the accounts record transactions in which two parties are involved, there are at least two possible sources of information about such transactions, and compilers can economise by targeting the least costly sources of information without compromising the quality of the data significantly. Quality of the data source is of paramount importance. Furthermore, surveys are not the only sources of information, and advantage must be taken of administrative and other records that contain relevant information obtainable at less cost than surveys.

1.51. However, before using information from surveys or administrative records, national accounts compilers must be sure that the information is consistent with national accounting standards and that there are no gaps or overlaps between the various sources. A high proportion of information used in compiling the Australian National Accounts comes from surveys that use the ABS register of businesses and other organisations (referred to as the 'business register') to provide the target population. The business register is a list of economic units that are defined according to national accounting standards. The units are also defined so as not to overlap, and every effort is made to include all economically significant units so that there are no gaps in the coverage of the relevant fields of economic activity. Although most of the ABS surveys that provide data for the ASNA are used primarily to compile other economic statistics, the survey questions are generally designed to comply with national accounting concepts so that the survey results are consistent with national accounts statistics. Where administrative data are used, the national accounts compiler has less control over the application of standards and the possible existence of gaps and overlaps. Some potential sources of this type may be rejected because they cannot be reconciled with survey results or deviate too much from national accounts standards.

1.52. Once reliable and consistent sources of data have been established, the major task of the national accounts compilers is to bring together the data in the national accounting framework. In some cases, there may be two sets of data relating to the same variables, in which case discrepancies must be investigated and a choice made as to which data are more reliable. Furthermore, the ASNA includes balances that are equal in concept but are derived from different data sources. For example, net lending or borrowing in the capital account is equal in concept to net change in financial position in the financial account but is derived entirely from non-financial transactions, whereas net change in financial position is derived entirely from financial transactions. Such balances provide a measure of the consistency of the two sets of data and can be used to monitor the accuracy and quality of the statistics. When differences are unavoidable or unresolved, rather than force a balance, compilers may record the differences in the accounts as 'statistical discrepancies' or 'net errors and omissions'.

1.53. Business and administrative records do not always provide information that reflects economic reality. For example, interest charges generally include a service charge as well as a return on capital invested. In such cases, the 2008 SNA prescribes imputation of the required information. In other cases, transaction flows have to be rerouted, as with employers' contributions to superannuation funds on behalf of their employees, which are paid to superannuation funds but are recorded in the ASNA as payable directly to employees as a component of employee remuneration. Therefore, national accounts compilers must put in place systems to derive such imputed information. Thus, data obtained from surveys or administrative records may be adjusted or rearranged to meet the 2008 SNA requirements.

1.54. Two significant processes are applied by compilers to derive additional data of considerable interest: time series analysis and production of chain volume measures. Time series analysis includes seasonal adjustment and estimation of trend values. Seasonal adjustment involves estimation of seasonal factors in the data and adjustment of the data to remove the seasonal effect. Trend values are estimated by removing irregular movements from seasonally adjusted data. Chain volume estimation involves removing the effects of price changes from source data, which are recorded at current prices.

1.55. Once all adjustments and derivations have been made, compilers should have a complete dataset that can be checked for consistency with data for previous periods and data from other systems. Known as output editing, this form of checking aims to detect errors that may have slipped through at earlier stages of compilation, and which may require inquiry back to the supplier of the source data. Data may be queried because the resulting movement from the previous period (or the same period in the previous year) appears implausible or is inconsistent with the movement in other related variables. After all checks have been completed and errors or inconsistencies explained or removed, the statistics are cleared by a senior statistician for publication.

1.56. Australian national accounts statistics include major economic indicators that are in strong demand and can influence financial markets. Therefore, care is taken to ensure that no user receives the statistics before the designated release time, with a small number of exceptions. These exceptions relate to designated officers in certain government departments, such as The Treasury and the Department of the Prime Minister and Cabinet, who are required to prepare briefing material on the statistics for their Ministers; they are subject to a strict embargo until the official release of the national accounts.

1.57. Because Australian national accounts statistics are often compiled from source data that are preliminary or incomplete, the statistics are often revised when final or more complete information comes to hand. Such revisions to the data are therefore relatively common. Furthermore, seasonally adjusted and trend data are subject to revision because the adjustment factors for seasonal and irregular influences change over time as more data are added to the time series. Similarly, chain volume measures are subject to revision whenever the reference period is changed and when a new base year is introduced.

### Uses of Australian national accounts statistics

1.58. The uses of the statistics included in the ASNA mainly arise from the role of the national accounts as a framework for evaluating economic performance. However, given the wide range of information included in the ASNA, economic performance can be evaluated at a number of different levels, including the economy as a whole, the various sectors and subsectors of the economy, individual States and Territories, individual industries and individual products. Furthermore, information is available for different time frames, including quarterly data for measuring short-term changes in economic conditions and more detailed annual information for measuring longer-term changes. Seasonally adjusted and trend series facilitate analysis of short-term movements in quarterly data, and chain volume measures help to isolate volume movements in the economic indicators.

1.59. The estimates of national income, expenditure and product are well established as a framework for monitoring the current performance of the Australian economy, and are closely followed and analysed by government and private sector economists, the media, financial markets, credit rating agencies and others with an interest in current economic trends. General interest centres on trend and seasonally adjusted chain volume measures of key variables such as gross domestic product as an indicator of growth, measures of income such as compensation of employees (COE) and gross operating surplus (GOS) of corporations, the expenditure items of final consumption expenditure (government and households) and gross fixed capital formation (GFCF), the ratio of net household saving to net household disposable income, and production classified by industry groupings. Such information is used in short-term economic forecasting, in analyses underlying forecasts and economic policy settings in Commonwealth and State/Territory government budgets, in models of economic activity that simulate the effects of economic policy and behaviour, and in international comparisons of Australia's economic performance with the performance of other countries.

1.60. As well as Australia's national accounts, the ABS produces annual accounts for each of Australia's States and Territories published in cat. no. 5220.0. These provide estimates of GSP and state final demand. An important use of the state accounts is to compare each State and Territory in terms of levels of economic activity and rates of economic growth.

1.61. The financial accounts data (published in cat. no. 5232.0) have more specialised uses, relating to financial markets and the financial sector. They are used by government and private sector economists as short-term indicators of the demand for credit, which reflects overall economic conditions and expectations. The sectoral and instrument breakdowns in the financial accounts enable detailed analysis of stocks and flows related to borrowing and lending. Depending on economic conditions, user interest may focus, for example, on the borrowing and debt of governments, or on the ratio of debt to equity financing of private corporations. The financial accounts provide an alternative view (to that shown in the real accounts) of national and sectoral

saving, and indicate the composition of saving in terms of financial instruments. For example, these accounts can show trends in household saving toward superannuation and the extent of accumulation of household debt. Financial market analysts and participants use the financial accounts to assess growth in the markets for various forms of finance (e.g. deposits, loans, shares, debt securities) and sources of finance (e.g. banks, non-bank depository institutions, life offices and pension funds, non-residents) used by borrowers.

1.62. The national balance sheet data on the level and composition of Australia's assets and liabilities indicate the economic resources of, and claims on, the nation and each sector, and support assessments of the external debtor or creditor position of a country. The monetary estimates of natural resources contained in the balance sheet are underpinned by a dataset of physical estimates detailing levels of particular natural resources. Due to the experimental nature of the monetary estimates, it is considered that monetary estimates on natural resources should be considered in conjunction with the physical estimates, especially for subsoil assets. The estimates provide information for monitoring the availability and exploitation of these resources and for assisting in the formulation of environmental policies and resource pricing.

1.63. Sectoral balance sheets provide information necessary for analysing a number of topics. Examples include:

- the computation of widely used ratios, such as debt to equity, non-financial to financial assets, and debt to income; and
- the provision of additional information on the relationship between consumption and saving behaviour.

1.64. Companies can compare the return on their own assets with returns achieved nationwide. Prospective investors may examine the unit values and returns on, for example, the various subsoil assets to guide investments in particular industries.

1.65. The ASNA I-O tables (published in cat. no. 5209.0.55.001 and 5215.0.55.001) provide a much more detailed disaggregation of gross domestic product than is available in the national income, expenditure and production GDP accounts. I-O tables are used to facilitate economic analysis in a number of ways, for example:

- they provide a means of undertaking comparative analysis of industries within an economy as well as across economies;
- they provide the basis for a detailed understanding of the linkages and dependencies that exist within an economy;
- given the set of assumptions implicit in the I-O framework, they provide a means of forecasting the economic effects of a change in demand on economic variables such as value added, prices and employment;
- they constitute a core component of many modern general equilibrium models which may be used for a number of purposes including forecasting; and
- they provide a framework whereby the confrontation of data from various sources can be undertaken, thereby providing a means of improving the accuracy of the national accounts and economic statistics in general.

1.66. Satellite accounts are used to expand the analytical capacity of the national accounts for selected areas of social concern in a flexible manner, without overburdening or disrupting the national accounts. They involve the rearrangement of classifications used in the national accounts and the possible introduction of complementary elements but do not change the underlying concepts of the national accounts.

1.67. The national accounts are used as a framework for other economic statistics. Given the comprehensive nature of the national accounts coverage of economic activity, most economic statistics relate in some way to elements of the national accounts. Conversely, national accounts compilers draw upon a wide range of economic statistics to provide information for inclusion in the national accounts. For these reasons, national statistical offices usually design economic statistics systems that are based on the concepts employed in the national accounts. Such a strategy ensures that users of economic statistics can relate the statistics to the national accounts, and that national accounts compilers have sources of information that are conceptually compatible with the national accounts. As noted previously, such an integrated approach to the production of economic statistics is followed in the ABS. It is administered through use of a single business register as the source of survey populations for most ABS economic statistics, and the strict application of national accounting concepts in the design of the business register and the surveys, including the units model, data item definitions and classifications.

# CHAPTER 2 OVERVIEW OF THE CONCEPTUAL FRAMEWORK

## INTRODUCTION

2.1 The conceptual framework of the ASNA is based on the standards set out in 2008 SNA. The ASNA does not include all of the elements of the 2008 SNA framework, although Australia's implementation of 2008 SNA is extensive. Also, although the concepts and definitions used in the ASNA generally conform with the standards set out in 2008 SNA, some minor variations have been adopted to allow for particular Australian data supply conditions or user requirements and these are noted at appropriate points throughout this manual.

2.2 The ASNA records the essential elements of the Australian economy: production, income, consumption (intermediate and final), accumulation of assets and liabilities, and wealth. These elements comprise economic flows and stocks that are grouped and recorded, according to specified accounting rules, in a set of accounts for the economy as a whole and for various sectors and subsectors. The sectors and subsectors comprise groups of institutional units with the same economic role. Statistics are also produced for industries, which comprise groups of producing units with common outputs. At a more detailed level, I-O statistics are produced that record the S-U of different types of goods and services, or products, by the various industries. Many of the statistics in the ASNA are compiled as chain volume measures as well as current price terms by application of 2008 SNA recommendations for price and volume measures.

## THE CONCEPTUAL ELEMENTS OF ASNA

### Institutional units and sectors

2.3 In 2008 SNA, the basic unit for which economic activity is recorded is the *institutional unit.* An institutional unit is an economic entity that is capable, in its own right, of owning assets, incurring liabilities and engaging in economic activities and transactions with other entities. In the Australian system, the legal entity unit is closest to the 2008 SNA concept of the institutional unit. However, in the ASNA, the unit used is the *enterprise,* which can be a single legal entity or a group of related legal entities that belong to the same institutional subsector. Four main types of institutional units are recognised in 2008 SNA and the ASNA: households, non-profit institutions, government units and corporations (including quasi-corporations).

2.4 Institutional units are grouped into institutional sectors according to their characteristics and institutional role. All households are allocated to the *household sector*. Corporations and quasi corporations are allocated to the *non-financial corporations sector* or the *financial corporations sector* according to whether their predominant function is production of goods and non-financial services or production of financial services, respectively. Government units are all allocated to the *general government sector.* The allocation of non-profit institutions depends on the nature of their operations. Those mainly engaged in market production are allocated to the relevant corporate sector. Those mainly engaged in non-market production are allocated to the general government sector if they are controlled and mainly financed by government, otherwise they are allocated to the *non-profit institutions serving households (NPISH) sector.* In the ASNA the NPISH sector is included in the household sector.

2.5 The various domestic sectors and subsectors include only resident institutional units. The concept of residency used is the same as used in balance of payments statistics, and is based on the requirement that, to be an Australian resident unit, an institutional unit must have a centre of predominant economic interest in Australia's economic territory.

2.6 Further detail on institutional units and sectors is outlined in Chapter 4.

## Transactions and other flows

2.7 Economic flows reflect the creation, transformation, exchange, transfer or extinction of economic value and involve changes in the volume, composition or value of assets and liabilities. In the national accounts, economic flows are divided between transactions and other flows. Transactions generally involve interactions by mutual agreement between institutional units, but also include certain events that occur within institutional units, such as consumption of fixed capital and some types of production for the unit's own use. Other economic flows are changes in the value or volume of assets and liabilities that arise from events other than transactions, such as mineral discoveries, catastrophic losses, depletion, write-offs, and growth of natural assets.

2.8 The 2008 SNA groups elementary transactions and other flows into a relatively small number of types according to their nature. They are:

> *"2.27 Transactions in goods and services (products) describe the origin (domestic output or imports) and use (intermediate consumption, final consumption, capital formation or exports) of goods and services. By definition, goods and services in the SNA are always a result of production, either domestically or abroad, in the current period or in a previous one.*
>
> *2.28 Distributive transactions consist of transactions by which the value added generated by production is distributed to labour, capital and government and transactions involving the redistribution of income and wealth (taxes on income and wealth and other transfers). The SNA draws a distinction between current and capital transfers, with the latter deemed to redistribute saving or wealth rather than income.*
>
> *2.29 Transactions in financial instruments (or financial transactions) refer to the net acquisition of financial assets or the net incurrence of liabilities for each type of financial instrument. Such changes often occur as counterparts of non-financial transactions. They also occur as transactions involving only financial instruments. Transactions in contingent assets and liabilities are not considered transactions in the SNA.*
>
> *2.30 Other accumulation entries cover transactions and other economic flows not previously taken into account that change the quantity or value of assets and liabilities. They include acquisitions less disposals of non-produced non-financial assets, other economic flows of non-produced assets, such as discovery or depletion of subsoil resources or transfers of other natural resources to economic activities, the effects of non-economic phenomena such as natural disasters and political events (wars for example) and finally, they include holding gains or losses, due to changes in prices, and some minor items."*

## Assets and liabilities

2.9 The 2008 SNA (and the ASNA is consistent with) states:

> *"2.33 Assets and liabilities are the components of the balance sheets of the total economy and institutional sectors. In contrast to the accounts that show economic flows, a balance sheet shows the stocks of assets and liabilities held at one point in time by each unit or sector or the economy as a whole. Balance sheets are normally constructed at the start and end of an accounting period but they can in principle be constructed at any point in time. However, stocks result from the accumulation of prior transactions and other flows, and they are modified by future transactions and other flows. Thus stocks and flows are closely related.*
>
> *2.34 The coverage of assets is limited to those assets which are subject to ownership rights and from which economic benefits may be derived by their owners by holding them or using them in an economic activity as defined in the SNA. Consumer durables, human capital and those natural resources that are not capable of bringing economic benefits to their owners are outside the scope of assets in the SNA.*
>
> *2.35 The classification of assets distinguishes, at the first level, financial and non-financial (produced and non-produced) assets. Most non-financial assets generally serve two purposes. They are primarily objects usable in economic activity and, at the same time, serve as stores of value.*

*Financial assets are necessarily and primarily stores of value, although they may also fulfil other functions.*"

### Products and producing units

2.10 Goods and services, also called products, are the result of production. They are exchanged and used for various purposes; as inputs in the production of other goods and services, as final consumption or for investment. Institutional units may produce a variety of products and therefore can be too heterogeneous in terms of their productive activity to provide useful information about industries. Hence 2008 SNA specifies the use of narrower units than institutional units for the purpose of providing statistics about production classified by industry.

2.11 The producing unit recommended in 2008 SNA is the kind-of-activity unit, which is a part of an institutional unit that engages in one productive activity. However, 2008 SNA also suggests that an alternative unit can be used, namely the establishment, which covers all productive activity at a single location.

2.12 In the ASNA, the producing unit is the *type of activity unit* (TAU), which is the largest unit within a business for which relevant accounts are kept, having regard for industry homogeneity. However, ASNA does not recognise an establishment unit as outlined in 2008 SNA.

2.13 In the ASNA, each TAU is classified to an industry that is defined in the ANZSIC06, which is based on the principles and classification structure set out in the United Nations' *International Standard Industrial Classification of All Economic Activities Revision 4* (ISIC, Rev. 4). ISIC is the industry classification that the 2008 SNA recommends for use in national accounts.

2.14 Further detail on products and producing units is outlined in Chapter 5.

### Relationship with other conceptual frameworks

2.15 The national accounts are important for providing a framework for economic statistics as a whole. The accounts provide a conceptual framework for ensuring the consistency of the definitions and classifications used in different, but related, fields of statistics. It also acts as an accounting framework to ensure the numerical consistency of data drawn from different sources. Consistency between different statistical systems enhances the analytical usefulness of all the statistics involved. Therefore the harmonisation of 2008 SNA and related statistical systems is a key feature of the system.

2.16 ASNA is also harmonised with the other statistical systems, i.e. the balance of payments, government finance statistics, and monetary and financial statistics. Australia's balance of payments was updated and aligns with BPM6, which was updated simultaneously with 2008 SNA. Australia's government finance statistics, which feed into the national accounts, will be aligned with the revised International Monetary Fund's GFSM due for release in 2012.

## RULES OF ACCOUNTING

2.17 Fundamental to the national accounts is the measurement of economic activity within the economy, that is the recording of the transfer of products from one unit to another. 2008 SNA states:

"*2.47 ... a distinction is made between legal ownership and economic ownership. The criterion for recording the transfer of products from one unit to another in the SNA is that the economic ownership of the product changes from the first unit to the second. The legal owner is the unit entitled in law to the benefits embodied in the value of the product. A legal owner may, though, contract with another unit for the latter to accept the risks and rewards of using the product in production in return for an agreed amount that has a smaller element of risk in it. Such an example is when a bank legally owns a plane but allows an airline to use it in return for an agreed sum. It is the airline that then must take all the decisions about how often to fly the plane, to where and at what cost to the passengers. The airline is then said to be the economic owner of the plane even though the bank remains the legal owner. In the accounts, it is the airline and not the bank that is shown as purchasing the plane. At the same time, a loan, equal in value to payments due to the bank for the duration of the agreement between them is imputed as being made by the bank to the airline.*"

2.18 The 2008 SNA, and ASNA, accounting rules cover the valuation, time of recording and grouping by aggregation, netting and consolidation of individual stocks and flows.

2.19 All entries in the national accounts should be recorded at the market price current at the time of recording. For exchanges of goods and services for cash, the transaction price is generally the appropriate value. Where no transaction price is available, reference is made to the market value of similar goods and services. When no market prices of equivalent goods and services are available, the goods and services are valued at cost. By convention, all non-market goods and services produced by government units and non-profit institutions are valued at cost. Some goods are valued by writing down (depreciating) the initial acquisition costs. Where none of the foregoing methods is feasible, use can be made of the present value of expected future returns. However, the method is not generally recommended.

2.20 2008 SNA recommends that all economic flows be recorded in the national accounts on an accrual basis (i.e. when economic value is created, transformed, exchanged, transferred or extinguished). Accrual recording ensures that economic events are recorded consistently and without distortion arising from leads and lags in accompanying cash flows. In general, use of accrual recording means that (i) flows involving change of ownership are recorded when ownership changes; (ii) services are recorded when provided; (iii) distributive transactions, which are those associated with the distribution of income to owners of the factors of production, are recorded as amounts payable accumulate; (iv) interest is recorded as it accumulates rather than when it falls due for payment; (v) output is recorded as production takes place; and (vi) intermediate consumption is recorded when goods and services are used. For the most part a strict accrual basis of recording is applied in the ASNA, although special procedures are sometimes required to estimate certain flows on an accrual basis. One exception relates to certain types of leave payments (e.g. payments for annual leave), which are recorded as compensation of employees when paid rather than when accrued.

2.21 In the national accounts, data are recorded in *aggregates* (i.e. the sums of the values of stocks and flows of a given type such as total output) and *balancing items* (i.e. the differences between aggregates on each side of an account or between other balancing items such as saving). A degree of netting is employed in the national accounts in as much as transactions with opposite sign are often combined (e.g. acquisitions and disposals of financial assets are recorded as 'net acquisitions'). *Consolidation* refers to the elimination from aggregates of transactions between units in the same sector or subsector. In the ASNA, for the most part, consolidation is generally confined to transactions within establishments, to transfers between institutional units within the general government and household sectors, and to transactions in used fixed assets within sectors. Note that property income flows within institutional sectors and sectoral (or subsectoral) transactions in financial instruments are consolidated in ASNA but not the 2008 SNA. Transactions between establishments of the same enterprise are generally not consolidated. However, transactions in financial instruments and related income flows are fully consolidated.

2.22 National accounting is based on the principle of double entry as in business accounting. Each transaction must be recorded twice, once as a resource (i.e. income) and once as a use (i.e. expense). The total of transactions recorded as resources and as uses must be equal, thus permitting a check on the consistency of the accounts. Economic flows that are not transactions have their counterpart directly as changes in net worth. In principle, the recording of the consequences of an action as it affects all units and all sectors is based on a principle of quadruple entry accounting, because most transactions involve two institutional units. Correctly recording the four flows involved ensures full consistency in the accounts.

## THE ACCOUNTS

### The full sequence of accounts

#### Introduction

2.23 2008 SNA divides the accounts into two main classes, the integrated economic accounts and the other parts of the accounting structure. The integrated economic accounts use the institutional units and sectors, transactions and assets and liabilities together with the rest of the world to form the accounts. These are the accounts presented in ASNA but not in the same format. The other parts of the accounting structure bring in the conceptual elements of production units, products, purposes, employment and population to assist in the production of the integrated economic accounts (e.g. S-U tables) or to present the data in different ways.

2.24 The integrated economic accounts are grouped into three categories:

1. Current accounts, present production, and the generation, distribution and use of income;

2. Accumulation accounts, present changes in assets and liabilities and changes in net worth (the difference between assets and liabilities for a given institutional unit or group of units); and

3. Balance sheets, present stocks of assets and liabilities and net worth. Opening and closing balance sheets are included with the full sequence of accounts.

2.25 The main accounts in the ASNA are as follows:

- gross domestic product (GDP) accounts, record the value of production (i.e. Industry Gross Value Added), the income from production (i.e. Income from GDP) and the final expenditures on goods and services produced and net international trade in goods and services (i.e. Expenditure on GDP);
- income accounts, show primary and secondary income transactions, final consumption expenditures and consumption of fixed capital;
- capital accounts, record the net accumulation, as the result of transactions, of non-financial assets; and the financing, by way of saving and capital transfers, of the accumulation;
- financial accounts, show the net acquisition of financial assets and the net incurrence of liabilities; and
- balance sheets, record the stock of assets, both financial and non-financial, and liabilities at a particular point in time.

2.26 The ASNA accounts are based on the system of accounts outlined in 2008 SNA. Each of the accounts are produced for the economy as a whole, and the set of accounts together constitute the consolidated summary accounts. In addition, income accounts, capital accounts, financial accounts and balance sheets are constructed for each of the four domestic institutional sectors, i.e. non-financial corporations, financial corporations, households (including non-profit institutions serving households) and general government. The national accounts also include a number of supplementary tables which provide more detailed presentations of the individual sector accounts. Although, in principle, production accounts could be constructed for the four individual institutional sectors, major interest centres instead around production on an industry basis. This cuts across the institutional sectors used in the income and capital accounts since the production units are classified by industry in such a presentation without regard to institutional sector.

2.27 Another account that is integral to the national accounts is the external account. This account records the transactions and financial positions of the nation with the rest of the world, from the point of view of the rest of the world. In one sense, the external account is simply another sectoral account. However, because of the important role of the rest of the world sector, the account is a major focus of attention for economic analysts and international organisations in their own right.

### Production account

2.28 The measure of production for the economy as a whole is gross domestic product (GDP). GDP is the sum, for a particular period, of the *gross value added* of all resident producers (where gross value added is equal to output less intermediate consumption) and net taxes on products. The is referred to as GDP measured by the production approach (GDP(P)). GDP can also be derived as the sum of factor incomes (i.e. compensation of employees, gross operating surplus and gross mixed income) and net taxes on production and imports; and as the sum of all final expenditures by residents (final consumption expenditure and GFCF), changes in inventories and exports less imports of goods and services. These are referred to as GDP measured by the income approach (GDP(I)) and GDP measured by the expenditure approach (GDP(E)), respectively. All three approaches are presented in the ASNA publications. In Australia, the combined presentation of the three approaches is referred to as the GDP Accounts. These reflect the 2008 SNA Production Account.

2.29 While each measure should, conceptually, deliver the same estimate of GDP, when the three measures are compiled independently using different data sources then different estimates of GDP result. However, the annual Australian national accounts estimates are integrated with annual balanced S-U tables which ensures the same estimate of GDP is obtained for all three approaches for the years in which these tables are available. The S-U tables have been compiled from 1994-95 up to the year preceding the latest completed financial year, except in the June quarter where it will be the latest two years.

2.30 Prior to 1994-95, the estimates using each approach are based on independent sources, and there are usually differences between the GDP I, E and P estimates. Nevertheless, for these periods, a single estimate of GDP has been compiled by taking a simple average of the I, E and P estimates.

2.31 As a result of the above methods:

- there are no statistical discrepancies for annual estimates from 1994-95 up to the year prior to the latest year (and the latest two years in the June quarter), in either current price or chain volume terms; and
- for years prior to 1994-95, for the latest year (and the latest two years in the June quarter), and for all quarters, statistical discrepancies exist between estimates based on the GDP I, E and P approaches and the single estimate of GDP, in both current price and chain volume terms. These discrepancies are shown in the relevant tables.

2.32 There is no institutional sector dimension to any of the GDP accounts, although the GDP(I) measure could be classified this way. GDP measured by the production approach (i.e. sum of value added) is presented by industry only. The valuation of the GDP in ASNA is at purchasers' prices, so net taxes on products are added to total gross value added to obtain GDP(P).

### Income account

2.33 2008 SNA splits the income account into several accounts as the process of distribution and redistribution of income is very important, so it is worth distinguishing various steps. It also includes the use of income account. The distribution of income is decomposed into three main steps: primary distribution (i.e. primary income), secondary distribution (i.e. secondary income) and redistribution in kind (i.e. social transfers in kind). The balancing items at the various stages are meaningful concepts of income provided all kinds of distributive current transactions are included. The ASNA includes all such transactions and, whilst the data are not presented in separate tables as outlined in 2008 SNA, each stage is presented in the income account with the balancing items being gross income and gross disposable income for all sectors, and adjusted disposable income for the general government and household sectors.

2.34 The transactions as presented in the ASNA are:

- Primary income consists of factor incomes, such as compensation of employees, gross operating surplus and gross mixed income, taxes less subsidies on production and imports, and property incomes, such as interest, dividends, rent on land and subsoil assets, and reinvested earnings of direct investors and investment funds. Gross national income is the balancing item and equals total factor incomes, plus taxes less subsidies on production and imports, plus net primary income receivable from non-residents.
- Secondary income consists of current transfers. Transfers are resources provided from one institutional unit to another for which nothing of economic value is provided in return. Current transfers include taxes on income and wealth, social contributions (e.g. for workers' compensation) and benefits (e.g. unemployment benefits), current grants between governments, and donations to non-profit institutions. Gross disposable income is the balancing item and is equal to the sum of primary and secondary incomes payable and receivable.
- Social transfers in kind exist only in the general government and household sector. They consist of goods and services provided to households by government (or NPISHs) either free or at prices that are not economically significant. They consist of final consumption expenditure undertaken by government (and NPISHs) on behalf of households, e.g. education and health services.

### Capital account

2.35 The capital account records the acquisitions less disposals of non-financial assets as well as capital transfers involving the redistribution of wealth. It shows sources of funds (receipts) for financing gross capital formation and the use of these funds (disbursements). Sources of funds comprise consumption of fixed capital, net saving transferred from the national income account and net capital transfers receivable from non-residents. On the disbursements side are shown GFCF, changes in inventories and net acquisitions of non-produced non-financial assets. Conceptually, net lending to non-residents is the balance of the national income account. However, if there are statistical discrepancies in the Expenditure on GDP account, then these discrepancies must also be taken into account before deriving the balancing item. If net lending is negative, then the economy is a net borrower from non-residents.

2.36 2008 SNA has an entry for acquisitions less disposals of valuables. While conceptually such transactions should be recorded in the capital account, they are currently not recorded in the capital account in the ASNA due to a lack of a suitable data source. It is worth noting that household final consumption expenditure (HFCE) does include expenditure on valuables by the household sector.

2.37 Similar information to that provided in the national capital account is provided in the sectoral capital accounts. The balancing item, net lending, reflects the net lending of a particular sector to all other sectors. As sectoral production accounts are not compiled, it is not possible to show any national statistical discrepancies by sector. Accordingly, the sectoral net lending balance includes, implicitly, each sector's share of the national statistical discrepancy. Capital accounts are also compiled for selected subsectors.

### Financial account

2.38 The financial account records the net acquisitions of financial assets and liabilities.

2.39 The financial account for each sector shows the financial transactions associated with the net lending transactions recorded in the capital account. The balance in each financial account is net change in financial position, which is equal to net acquisition of financial assets less net incurrence of liabilities. Conceptually, this balance is the same as net lending/borrowing derived from the relevant capital account. However, due to measurement imperfections, in both accounts, this is seldom the case in practice and a net errors and omissions item is included to achieve balance.

2.40 In the national financial account, transactions in financial assets and liabilities with non-residents are shown. The national financial account is identical to the financial account in the balance of payments. Note however, the signs are reversed between the two as the balance of payments is based on the point of view of the resident, whereas the national accounts take the view of the non-resident. Financial accounts are also compiled for each sector and for a wide range of subsectors. In these financial accounts, the transactions relate to financial assets and liabilities with other sectors/subsectors.

### Other changes in the volume of assets account

2.41 The other changes in the volume of assets account records the effect of exceptional events that cause not only the value but also the volume of assets and liabilities to change. They may be divided into three main categories:

1. normal appearance and disappearance of assets other than by transactions, such as discovery and depletion of subsoil assets, and growth and depletion of native forests; economic recognition of produced assets such as public monuments and valuables; the initiation and cancellation of contracts, leases and licences such as patents, broadcast licences and taxi plates; changes in the value of goodwill and marketing assets; and the appearance or disappearance of financial assets;

2. changes in assets and liabilities due to exceptional, unanticipated events, such as changes (normally losses) in assets due to natural disasters (such as bush fires, floods and earthquakes), war or severe acts of crime, and uncompensated seizures of assets; and

3. changes in classification and structure: in the event that the activities of an institutional unit change to the extent that the unit is reclassified from one institutional sector to another (for example, from the non-financial corporations sector to the financial corporations sector), the movements of assets and liabilities between the sectors are recorded as part of other flows in this category.

2.42 The balancing item for this account is changes in net worth due to other changes in the volume of assets. In ASNA other changes in the volume of assets are recorded in an account that reconciles the values of assets and liabilities recorded in the opening and closing balance sheets.

### Revaluation account

2.43 The revaluation account records holding gains and losses which result from changes in the prices of financial and non-financial assets and liabilities. Holding gains and losses accrue to the owners of assets and liabilities purely as a result of holding the assets or liabilities over time, without transforming them in any way. Holding gains and losses include not only gains/losses on 'capital' goods such as fixed assets, land and other natural resources, and financial assets and liabilities, but also inventories, including work-in-progress.

2.44 The balancing item for this account is changes in net worth due to nominal holding gains and losses. In ASNA holding gains and losses are recorded in an account that reconciles the values of assets and liabilities recorded in the opening and closing balance sheets.

2.45 Holding gains and losses measured on the basis of current prices are called nominal holding gains and losses. 2008 SNA notes that these nominal gains and losses can be further decomposed into neutral holding gains and losses, reflecting changes in the general price level, and real holding gains and losses, reflecting changes in the relative prices of assets. The ASNA shows this decomposition for the total economy and also for the household sector.

### Balance sheets

2.46 The national balance sheet shows, at particular points in time, the aggregate value of Australian residents' non-financial assets, their financial claims on non-residents, and their liabilities to non-residents. The balancing item is net worth and is the difference between assets and liabilities. Net worth is equivalent to the present value of the stock a unit or sector holds.

2.47 Similar information is shown for each sector in the sectoral balance sheets. For financial assets and liabilities, the amounts shown are the outstanding claims on and liabilities to other sectors on the balance sheet dates. For non-financial assets, the amounts shown represent each sector's share of the Australian value as at the balance sheet dates.

2.48 The opening and closing balance sheets display assets, liabilities and net worth valued at the prices of the date for which the balance sheet is compiled. Conceptually, the entries for the closing balance sheet are equal, asset by asset and liability by liability to the entries in the opening balance sheet plus changes in the accumulation accounts, i.e. the capital account, the financial account, the other changes in the volume of assets account and the revaluation account.

2.49 2008 SNA includes entries for valuables and non-produced non-financial assets. Conceptually these assets should be recorded in the balance sheets. However, valuables; water resources; goodwill and marketing assets; and contracts, leases and licences are not recorded in the ASNA (with the exception of spectrum licences) due to a lack of suitable data sources.

2.50 Supplementing the balance sheets are accounts that show the changes in balance sheet positions during a particular period. In these accounts, changes in balance sheets are decomposed into transactions (which are equivalent to the relevant transactions recorded in the capital and financial accounts), revaluations due to the effect of price changes, and other changes affecting the volume of assets and liabilities.

### External account

2.51 The external accounts show the economy's transactions and stock positions with non-residents, from the non-residents' perspective.

2.52 In the ASNA, external income, capital, financial and balance sheet accounts are provided. The external income account is analogous to the balance of payments current account. As such, its balance - balance on external current account - is the same as, but with opposite sign to, the balance on current account recorded in the balance of payments. The balance on the external account - net lending - is the same as, but with opposite sign to, the sum of the current and capital account balances in the balance of payments. The external financial account includes the balance of payments financial account together with net lending of non-residents (the sum of the balance of payments current and capital account balances) and the difference between the two, i.e. the balance of payments net errors and omissions item.

## Integrated presentation of the accounts

### Introduction

2.53 Once all elements have been produced it is possible to present in detail the integrated accounts. The integrated accounts give a complete picture of the accounts of the total economy including balance sheets, in a way that permits the principal economic relations and the main aggregates to be shown. The level of detail can vary depending on the purpose.

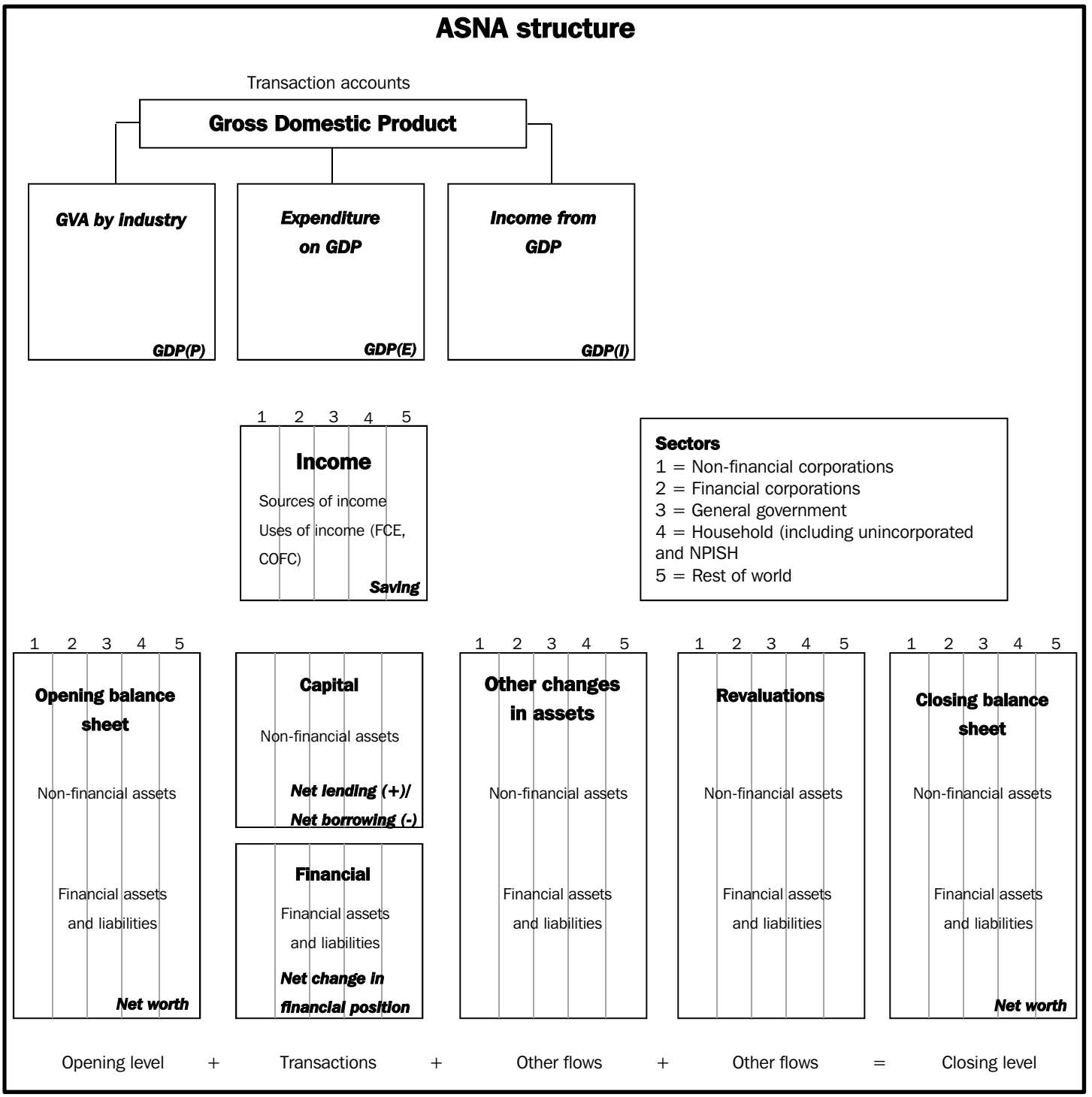
2.54 The following table provides a summary of the accounts, balancing items and main aggregates within the 2008 SNA and the comparison with the ASNA. The purpose of the table is to illustrate how the ASNA presentation compares with the 2008 SNA presentation.

Table 2.1 Summary of accounts, balancing items and main aggregates

| SNA presentation | | | ASNA presentation | |
|---|---|---|---|---|
| **Account** | **Balancing item** | **Main aggregate** | **Account** | **Main aggregate** |
| **Current accounts** | | | **Current accounts** | |
| ***Production account*** | | | ***GDP accounts*** | |
| Production account<br>Goods and services account<br>Generation of income account | Value added<br>Operating surplus/mixed income | Domestic product | Industry gross value added (GDP(P))<br>Expenditure on GDP (GDP(E))<br>Income from GDP (GDP(I)) | Gross Domestic Product |
| ***Distribution and use of income accounts*** | | | ***National Income Account*** | |
| Allocation of primary income account | Balance of primary income | National income | | Gross national income |
| Secondary distribution of income account | Disposable income | National disposable income | | Gross disposable income |
| Redistribution of income in kind account | Adjusted disposable income | | | Adjusted disposable income |
| ***Use of income accounts*** | | | | |
| Use of disposable income account | Saving | | | Use of gross disposable income<br>Saving |
| Use of adjusted disposable income account | Saving | National Saving | | Saving |
| **Accumulation accounts** | | | **Accumulation accounts** | |
| Capital account | Net borrowing(+)/Net lending (-) | | Capital account | Net borrowing(+)/Net lending (-) |
| Financial account | Net borrowing(+)/Net lending (-) | | Financial accounts | Net change in financial position |
| ***Other changes in volume of assets account*** | | | | |
| Other changes in volume of assets account | | | *Included in balance sheets* | |
| Revaluation account | | | *Included in balance sheets* | |
| **Balance Sheets** | | | **Balance Sheets** | |
| Opening balance sheet | Net worth | National wealth | Opening balance sheet | Net worth |
| Changes in assets and liabilities | Changes in net worth | | Changes in assets and liabilities | Changes in net worth |
| | | | Net capital formation | |
| | | | Financial transactions | |
| Other changes in volume of assets | | | Other changes in volume | |
| Revaluations | | | Revaluations | |
| Closing balance sheets | Net worth | National wealth | Closing balance sheets | Net worth |

2.55 The following figure illustrates the integrated accounts as presented in the ASNA:

Figure 2.1 ILLUSTRATION OF THE ASNA STRUCTURE



## The aggregates

2.56 The aggregates, including value added, income, consumption and saving, are composite values which measure one aspect of the activity of the entire economy. They are summary indicators and key magnitudes for purposes of macroeconomic analysis and comparisons over time. Some aggregates may:

- be obtained directly as totals of particular transactions, e.g. final consumption, GFCF and social contributions; or
- result from aggregating balancing items for the institutional sectors e.g. value added, disposable income and saving.

2.57 There are a couple of key points that need to be addressed before the aggregates can be presented. First is the notion of net and gross measures. The distinction between the two is whether or not consumption of fixed capital has been deducted. A gross measure includes consumption of fixed capital, whereas net measures have consumption of fixed capital deducted. 2008 SNA recommends that net measures should be the main measures as they take into account a reduction in the value of previously created fixed assets when they are used up in the production process. However, the SNA recognises that it is very difficult to measure consumption of fixed capital with any precision and so acknowledges that the gross measures will be commonly used in practice.

2.58 Second is the measurement of aggregates in current price or volume measures. It is desirable to measure the aggregates in volume terms so that the price effect is eliminated and thereby obtain a real change from one period to another. However, some aggregates, such as income, are not able to be measured in volume terms as they cannot be broken down into a quantity and a price component.

2.59 Some of the key aggregates are:

***Gross Domestic Product (GDP)***

*GDP derives from the concept of value added. Gross value added is the difference between output and intermediate consumption. GDP is the sum of gross value added of all resident producer units plus taxes on products less subsidies on products. This derivation is referred to as GDP measured by the Production Approach (GDP(P)).*

GDP(P) = Output - Intermediate Use + Taxes on Products - Subsidies on Products

*GDP is also equal to the sum of the final uses of goods and services (all uses except intermediate consumption) measured at purchasers' prices, less the value of imports of goods and services. This derivation is referred to as GDP measured by the Expenditure Approach (GDP(E)).*

GDP(E) = Final Consumption Expenditure by Households (C) and Government (G) + Gross Capital Formation + Exports of goods and services (X) - Imports of goods and services (M)

*Finally, GDP is also equal to the sum of primary incomes distributed by resident producer units. This derivation is referred to as GDP measured by the Income Approach (GDP(I)).*

GDP(I) = Compensation of Employees (CoE) + Gross Operating Surplus (GOS) + Gross Mixed Income (GMI) + (Taxes on Production and Imports - Subsidies on Production and Imports (NT))

***Gross National Income (GNI)***

*GNI is equal to GDP less primary incomes payable to non-resident units plus primary incomes receivable from non-resident units. In other words, GNI is equal to compensation of employees, plus gross operating surplus and gross mixed income, plus taxes (less subsidies) on production and imports, plus property income payable to the rest of the world plus the corresponding items receivable from the rest of the world. Thus GNI is the sum of gross primary incomes receivable by resident institutional units or sectors. In contrast to GDP, GNI is not a concept of value added, but a concept of income. By deducting the consumption of fixed capital from GNI, net national income (NNI) is obtained.*

GNI = CoE + GOS + GMI + NT + Net primary income receivable from non-residents (NPINR)

= GDP + NPINR

***Gross National Disposable Income (GNDI)***

*Gross national disposable income is equal to GNI less current transfers (other than taxes, less subsidies, on production and imports) payable to non-resident units, plus the corresponding transfers receivable by resident units from the rest of the world. Gross national disposable income measures the income available to the total economy for final consumption and gross saving. By deducting the consumption of fixed capital from gross national disposal income, net national disposable income is obtained. National disposable income is the sum of disposable income of all resident institutional units or sectors.*

GDNI = CoE + GOS + GMI + NT + NPINR + Net current transfers receivable from non-residents (NCT)

= GDP + NPINR + NCT

## Other parts of the accounting structure

### Supply and use tables

2.60 2008 SNA states that the detailed analysis of production by industries and flows of goods and services by kind of products is an integral part of the integrated central framework. It indicates that the detailed analysis of production activities and product balances is made in the S-U tables presenting:

- the resources and uses of goods and services for each type of product;
- the production and generation of income accounts for each industry according to kind of economic activity; and
- data on factors of production (labour and fixed capital) used by industries.

2.61 S-U tables are a powerful tool to compare and contrast data from various sources and improve the coherence of the economic information system. They permit an analysis of markets and industries and allow productivity to be studied at this level of disaggregation. A fundamental role is played in the ASNA by S-U tables as they show, for the economy as a whole and for groups of products, the total resources in terms of domestic output and imports, and the uses of goods and services in terms of intermediate consumption, final consumption, gross capital formation and exports. They also provide information on the generation of income from production.

2.62 The S-U tables reconcile how the supply of products (either by domestic production or imports) within the economy in an accounting period is used for intermediate consumption, final consumption, capital formation or exports. Once both sides are equal (i.e. supply = use) for all products the S-U tables are said to be balanced. Balanced S-U tables provide the benchmarks for the annual current price and chain volume measure for GDP.

### Input and output tables

2.63 The ASNA includes symmetric I-O tables which provide a means of undertaking more detailed analysis of the process of production and the use of goods and services (products) and of the income generated in that production than is possible with S-U tables. 'Symmetric' means that the same classifications or units (e.g. the same groups of products) are used in both rows and columns.

2.64 The I-O tables serve two purposes: statistical and analytical. They provide a framework for checking the consistency of statistics on flows of goods and services obtained from quite different kinds of statistical sources, e.g. industrial surveys, household expenditure inquiries, investment surveys, foreign trade statistics, etc. They serve as a coordinating framework for economic statistics, both conceptually for ensuring the consistency of the definitions and classifications used and as an accounting framework for ensuring the numerical consistency of data drawn from different sources. The I-O framework is also appropriate for calculating much of the economic data contained in the national accounts and detecting weaknesses. This is particularly important for the decomposition of the values of flows of goods and services into prices and volumes for the calculation of an integrated set of price and volume measures. As an analytical tool, I-O data are conveniently integrated into macroeconomic models in order to analyse the link between final demand and industrial output levels. I-O analysis also serves a number of other analytical purposes or uses.

2.65 The symmetric I-O tables are derived out of the S-U tables. However, as the latter are data-orientated in nature, adjustments are required in the compilation in the former, particularly with respect to valuation, the treatment of imports and classifications. The links between the I-O tables and the S-U tables are described in the chapter on input and output tables.

### Tables of financial transactions and financial assets

2.66 In concept, the accounts show which sectors acquire which financial assets and incur which liabilities. In order to examine the working of the financial sector, the first expansion of the financial account in ASNA is to distinguish subsectors within financial corporations and eleven categories of financial assets and liabilities.

2.67 The ASNA flow of funds matrices, published in *ABS National Accounts, Financial Accounts (cat. no. 5232.0),* differ from the 2008 SNA flow of funds matrices because:

- the ASNA flow of fund matrices include the capital account in its presentation; and
- the financial accounts presented are not in the required from-whom-to-whom framework as described in 2008 SNA (paragraph 2.150)
  *"It shows which sectors and subsectors incur loans and make deposits but it does not allow an in-depth examination of the intermediation process whereby a financial institution draws in funds, repackages them and issues them as other instruments to other units. In order to explore this, a three-dimensional "from-whom-to-whom" style of presentation is needed. This is referred to as a flow of funds matrix. The three-dimensional table of financial transactions is usually presented as a series of matrices, one matrix for each kind of financial instrument showing the flows from one sector to another.*

2.68 However, cat. no. 5232.0 includes financial instrument market tables for the twelve financial instruments in a from-whom-to-whom framework with 19 available counterparty sectors and subsectors. Each financial instrument is presented by issuing/ accepting/ borrowing sector/subsector by counterparty. For these tables, transactions and stocks between intra-sector/subsector are presented, for example bank deposits held by other banks. If required, the financial market tables would enable the ASNA to produce the flow of funds matrix as described in paragraph 2.150 of the 2008 SNA.

## SOURCES AND METHODS

2.69 ASNA records the essential elements of the Australian economy: production, income, consumption (intermediate and final), accumulation of assets and liabilities, and wealth. As such, many different data sources are used to compile the ASNA. In many cases these data are infrequent, incomplete, lacking in scope or simply not on a national accounts basis. The following provides an overview of the sources and methods employed to convert these different data sources into a coherent set of national accounts.

# CHAPTER 3 STOCKS, FLOWS AND ACCOUNTING RULES

## FLOWS AND STOCKS

3.1 The system of national accounts records two basic kinds of information: flows and stocks. Flows refer to actions and to the effects of events that take place within a given period of time, while stocks refer to positions, or holdings of, assets and liabilities at a given point in time. Unless otherwise indicated, the definitions and rules described are as recommended in 2008 SNA and are applied without variation in the ASNA.

3.2 In the national accounts, flows are recorded in the current accounts, which deal with production, income and the use of income, and in the accumulation accounts, which record capital formation, financial flows, revaluations and other changes in the volume of assets. Stocks, which represent the value of the stock of assets and liabilities at the beginning and end of the accounting period, appear in the balance sheet accounts.

### Flows

3.3 Economic flows reflect the creation, transformation, exchange, transfer or extinction of economic value. They involve changes in the volume, composition or value of an institutional unit's assets and liabilities. Economic flows are of two kinds: *transactions,* and *other flows.* Most flows are *transactions* which are recorded in the current accounts and accumulation accounts. Other flows, which are changes in the value of assets and liabilities that do not result from transactions, are recorded in the revaluation account and the other changes in volume of assets account.

### Transactions

3.4 A transaction is defined in 2008 SNA (paragraph 3.7) as:

> *"an economic flow that is an interaction between institutional units by mutual agreement or an action within an institutional unit that it is analytically useful to treat like a transaction.".*

3.5 The latter types of actions are internal transactions. Apart from these, transactions are interactions between institutional units. While the definition of a transaction stipulates that an interaction between institutional units must be by mutual agreement, this does not mean that both units necessarily enter a transaction voluntarily; some transactions, such as payments of taxes, fees or fines, are imposed by force of law. In these cases there is collective acceptance by the community of the obligation to make the required payments, which are therefore regarded as transactions for national accounting purposes. The system of national accounts recognises and accounts for numerous types of transactions, both monetary and non-monetary, which are described in the following paragraphs.

#### *Monetary transactions*

3.6 Most transactions recorded in the national accounts are monetary transactions, where the institutional units involved make or receive payments, or incur liabilities or receive assets denominated in units of currency. All monetary transactions are two-party transactions between institutional units. Common monetary transactions included in the ASNA are expenditure on consumption of goods and services, expenditure on capital formation, deposits, loans, wages and salaries, interest, dividends, rent on natural assets, taxes, and social assistance benefits in cash.

3.7 Expenditures on consumption of goods and services, capital formation, deposits, loans, payment or receipt of wages and salaries, and payment or receipt of interest, dividends and rent on natural assets, are two-party transactions involving the provision of a good, service or asset in exchange for a monetary counterpart. These kinds of transactions can be termed 'something for something' transactions, or transactions with a quid pro quo. Two-party transactions where goods, services or assets are supplied without a direct counterpart can be termed 'something for nothing' transactions, or transactions without a quid pro quo. Transactions without a quid pro quo are called *transfers* in the national accounts. Examples of transfers are taxes, social assistance benefits, gifts and international cooperation (foreign aid). Transactions such as the payment of premiums for non-life insurance, where receipt of benefits is contingent upon some future

event, are also classified as transfers. (Strictly speaking, insurance premiums are divided into two components in the national accounts: an imputed service charge; and net premiums, which are equal to premiums less the imputed service charge. Net premiums are a transfer payment while the imputed service charge is included in household or intermediate consumption.)

3.8 A distinction is made between capital and current transfers in the national accounts. Capital transfers involve the transfer of ownership of an asset or oblige one or both parties to acquire or dispose of an asset. Investment grants are examples of capital transfers. Capital transfers redistribute saving or wealth. Current transfers, on the other hand, redistribute income in the form of, for example, income taxes or social assistance benefits.

3.9 Most transactions are treated in the national accounts in a straightforward way; that is, the transactions are recorded in the same way as they appear in the accounts of the institutional units involved. However, some transactions are rearranged in order to bring out the underlying economic relationships more clearly. Transactions can be rearranged in three ways: rerouting, partitioning and recognising the principal party to a transaction.

Rerouted transactions

3.10 A transaction that appears to the units involved as taking place directly between units A and C may be recorded as taking place indirectly through a third unit B. Thus, the single transaction between A and C is recorded as two transactions: one between A and B, and one between B and C. In this case the transaction is considered to be "rerouted".

3.11 Rerouting of three types of transactions occurs in the national accounts:

1. *Employers' social contributions - workers' compensation premiums, and contributions made by employers on behalf of their employees to superannuation funds, are recorded as two transactions: employers are deemed to pay the contributions to their employees and the employees are then deemed to pay the same contributions to non-life insurance corporations or superannuation funds. Although the contributions are paid directly by employers to the funds, this treatment makes it clear that such contributions are part of the compensation of employees, and are recorded as a part of labour costs.*

2. *Retained earnings of foreign direct investment enterprises and resident and non-resident investment funds - the retention of some or all of the earnings of a foreign direct investment enterprise and investment funds within the enterprise or investment fund can be regarded as a deliberate investment decision by the foreign owners and fund investors. Accordingly, the retained earnings are rerouted in the national accounts by showing them as first remitted to the foreign owners and fund investors as property income and then reinvested in the equity of the direct investment enterprise and investment funds.*

3. *Property income of non-life insurance corporations or pension funds - in the national accounts, the property income earned on the reserves of certain insurance and pension funds is deemed to be earned on assets owned by policy-holders. The property income is recorded as being paid out to policy-holders and then paid back again as premium supplements even though the property income is retained by the corporation.*

Partitioned transactions

3.12 When a transaction appearing to the parties involved as a single transaction is recorded as two or more differently classified transactions, the transaction is partitioned. Partitioning does not usually imply the involvement of additional institutional units in the transactions.

3.13 Payments and receipts of interest by financial intermediaries, and non-life insurance premiums, are typical partitioned transactions. In the case of interest, the payments are considered to comprise a pure interest component and a charge for the financial service rendered by the financial institution. Similarly, non-life insurance premiums are considered to constitute a payment to cover the insurance risk and a service charge for arranging the insurance. The individual components are recorded separately in the national accounts.

3.14 A further example of partitioning is the recording of transactions for wholesalers and retailers. Wholesalers and retailers are viewed in 2008 SNA as selling the service of storing and displaying goods. As a result, the output of wholesalers and retailers is measured by the value of the trade margins on the goods they purchase for resale, not the total value of their sales.

Recognising the principal party to a transaction

3.15 When a unit carries out a transaction on behalf of another unit, the transaction should be recorded exclusively in the accounts of the principal, although some service output by the intermediary may be recognised. For example, if a commercial agent makes purchases under the order and at the expense of another party, the purchases are attributed to the latter. The accounts relevant to the agent should only show the fee charged to the principal for the services rendered by the agent.

*Non-monetary transactions*

3.16 Transactions that do not involve the exchange of cash, or assets or liabilities that are not denominated in units of currency, are non-monetary transactions. As the national accounts record all transactions in monetary values, the values recorded for non-monetary transactions must be estimated. Non-monetary transactions can be either two-party transactions or actions within an institutional unit (internal transactions).

Two-party non-monetary transactions

3.17 Two-party non-monetary transactions consist of the following:

- *Barter transactions,* which involve one party providing a good, service or asset other than cash to another party in return for a good, service or asset other than cash.
- *Remuneration in kind,* which occurs when an employee accepts payment from an employer in the form of goods and services instead of money (or some other financial asset). Some of the most common types of remuneration in kind are meals and drinks; accommodation; vehicles for personal use of employees; and goods and services produced as outputs from the employer's own production processes.
- *Payments in kind other than remuneration in kind,* which occur when payments are made in the form of goods and services, rather than money or some other financial asset (e.g. landlords accepting produce in lieu of rent).
- *Transfers in kind,* which occur when one party provides a good, service or asset to the other without receiving anything in return. These can also be called 'something for nothing' transactions, or transactions without a quid pro quo. The most common types of transfers in kind are international aid in the form of goods or services; gifts and charitable contributions in the form goods or services; and social assistance benefits in forms such as the provision of education, health, housing and other services provided to households by government or non-profit institutions. Also included are social transfers in kind which consist of government final consumption expenditure (GFCE) which is undertaken (by government) on the behalf of households.

Internal transactions

3.18 While most transactions recorded in the national accounts are interactions between institutional units, some actions that occur within institutional units are also recorded as transactions. These are known as internal, or intra-unit transactions, which are recorded to give a more analytically useful picture of output and final use.

3.19 Consumption of fixed capital is an important example of an intra-unit transaction which is recorded in the ASNA. The estimation of consumption of fixed capital ensures that the decline in the value of a fixed asset used in production is included as a cost of production.

3.20 Estimates of the value of intra-unit transactions are also made to account for output which is produced and used within the same institutional unit. These transactions include the value of fixed assets produced for own use and the value of goods produced and consumed within households (such as agricultural produce and other 'backyard' production). The supply of output produced within an enterprise for use as intermediate input in the same enterprise is also regarded as an intra-unit transaction, although estimates of the value of such transactions are only recorded in national accounts if the supplying and receiving establishments are geographically separated.

### Externalities and illegal actions

3.21 Externalities are unsolicited services, or 'disservices', delivered by one unit to another without mutual agreement. A typical example is a producer's pollution of air or water which is used by other units. Externalities are not market transactions into which institutional units enter of their own accord, and there is no mechanism to ensure that the positive or negative values attached to them by the various parties involved would be mutually consistent. For this reason, 2008 SNA recommends against recording the values of externalities in the national accounts.

3.22 2008 SNA treats illegal actions that fit the characteristics of transactions (notably the characteristic that there is mutual agreement between the parties) in the same way as legal actions. Thus, although the production or consumption of certain goods such as narcotics may be illegal, market transactions in such goods should, in principle, be recorded in the national accounts. Due to the difficulty in identifying and valuing illegal transactions, no explicit estimates for such activities are made in the ASNA. However, some illegal transactions are likely to be included in the national accounts if they are reported as part of legal activities or as income for taxation purposes.

3.23 As illegal actions which constitute crimes against persons or property (for example theft or violence) do not meet the criterion of transactions by mutual agreement they are not recorded as transactions.

### Other flows

3.24 Other flows are changes in the value of assets and liabilities that do not take place through transactions. They are either other changes in the volume of assets or liabilities, or holding gains and losses. Entries classified as other flows all appear in the other changes in volume of assets account or the revaluation account. Both of these accounts are components of the balance sheet accounts in the ASNA.

## Stocks

3.25 Stocks are holdings of assets and liabilities at a point in time. Stocks are usually recorded at the beginning and end of each accounting period. The values of stocks of assets and liabilities are shown in the balance sheets of the system. Stocks are connected with the flows in that changes in their levels result from the accumulation of transactions and other flows over the accounting period in question. In the ASNA, closing balance sheet levels could be viewed as being obtained by the addition to the opening balance sheet levels of net capital formation, financial transactions, other changes in the volume of assets, and revaluations of assets and liabilities. However, in practice the balance sheet values for many components of financial assets and liabilities are obtained directly from survey data.

3.26 Values are recorded for non-financial assets, both produced and non-produced, and for financial assets and liabilities. The coverage of assets is limited to those assets used in economic activity and that are subject to ownership rights. Thus, stocks are not recorded for assets such as human capital and natural resources over which ownership rights cannot be enforced.

3.27 In order to discuss stocks it is necessary to define assets and liabilities and these definitions depend crucially on the concepts of benefits and ownership. This is described as the asset boundary.

## Economic benefits

3.28 An economic benefit is defined as denoting a gain or positive utility arising from an action. It implies a comparison between two states. Sometimes the immediate benefit is in terms of goods and services directly, for example own account production or wages and salaries in kind. More often a benefit is in the form of the medium of exchange (money), for example as wages and salaries. Consumption is an activity that takes place in the current period only but may be financed from past benefits. Production and accumulation also involve benefits postponed to future periods. Thus, means of allowing benefits to be moved from one accounting period to another have to be recognised. These take the form of assets and liabilities where a benefit in one period is converted to a benefit in one or more future periods. Similarly goods and services, or current benefits, may be acquired by committing future benefits in the form of financial liabilities.

3.29 Two types of ownership can be distinguished, legal ownership and economic ownership. The legal owner of entities such as goods and services, natural resources, financial assets and liabilities is the institutional unit

entitled in law and sustainable under the law to claim the benefits associated with the entities. The economic owner of entities such as goods and services, natural resources, financial assets and liabilities is the institutional unit entitled to claim the benefits associated with the use of the entity in question in the course of an economic activity by virtue of accepting the associated risks.

3.30 Every enterprise has both a legal owner and an economic owner, though in many cases the economic owner and the legal owner of an entity are the same. Where they are not, the legal owner has handed responsibility for the risk involved in using the entity in an economic activity to the economic owner along with associated benefits. In return the legal owner accepts another package of risks and benefits from the economic owner. In general within the SNA, when the expression "ownership" or "owner" is used and the legal and economic owners are different, the reference should be understood to be to the economic owner.

## BALANCING ITEMS

3.31 A balancing item is obtained by subtracting the total value of the entries on one side of an account from the total value of entries the other side. It cannot be measured independently of the other entries. It does not relate to any specific set of transactions, or any set of assets, and so it cannot be expressed in terms of its own price or quantity units.

### Balancing items in the flow accounts

3.32 Balancing items are not simply devices to ensure that accounts balance. They are often used as key macroeconomic indicators to assess economic performance. They encapsulate a great deal of information and include some of the most important entries in the accounts, for example:

- Value added or domestic product,
- Operating surplus,
- Disposable income,
- Saving,
- Net lending or net borrowing,
- Net change in financial position,
- Current external balance.

### Balancing item in the balance sheets

3.33 Net worth, which is defined as the value of all the non-financial and financial assets owned by an institutional unit or sector less the value of all its outstanding liabilities, is the balancing item in the balance sheets. Net worth cannot be measured independently of the other entries, nor does it relate to any specific set of transactions.

3.34 As well as net worth appearing as a stock level, changes in net worth due to different sorts of transactions and other flows may also be derived. Just as the changes in the levels of any asset can be traced through changes in transactions and other flows throughout the period, so changes in total net worth can be exhaustively described according to the transactions and other flows that led to changes in the total level of assets and liabilities.

## GROUPING STOCKS AND FLOWS IN THE ACCOUNTS

3.35 2008 SNA groups flows and stocks according to the classification of transactions, other flows, and entries related to stocks of assets and liabilities. The classification of transactions and other flows has five headings at the highest level, dealing with transactions in products, transactions showing how income is distributed and redistributed within the SNA, transactions in non-produced assets, financial assets and liabilities, and other accumulation entries.

3.36 In general, flows and stocks are entered either in the accounts of the institutional units that own or owned the goods and assets involved; the accounts of units that deliver or take delivery of services; or the accounts of units that provide labour and capital or use them in production.

## ACCOUNTING RULES

3.37 The ASNA's accounting rules cover the valuation, time of recording and grouping by aggregation, netting and consolidation of individual stocks and flows.

### Quadruple-entry accounting

3.38 The accounting system underlying the ASNA derives from broad bookkeeping principles. To understand the accounting system for the ASNA, three bookkeeping principles should be outlined:

1. Vertical double-entry bookkeeping, also known simply as double-entry bookkeeping used in business accounting - each transaction leads to at least two entries, traditionally referred to as a credit entry and a debit entry, in the books of the transactor. It ensures the total value of assets equals the total value of liabilities plus net worth of a unit's balance sheet;

2. Horizontal double-entry bookkeeping - is useful for compiling accounts that reflect the mutual economic relationships between different institutional units in a consistent way. It ensures the consistency of recording for each transaction category by counterparties; and

3. Quadruple-entry bookkeeping - the simultaneous application of both the vertical and horizontal double-entry bookkeeping, which is the accounting system underlying the recording of transactions in the ASNA.

3.39 Quadruple- entry bookkeeping deals in a coherent way with multiple transactors or groups of transactors, each of which satisfies vertical double-entry bookkeeping requirements. A single transaction between two counterparties thus gives rise to four entries. In contrast to business bookkeeping, national accounts deal with interactions among a multitude of units in parallel, and thus require special care from a consistency point of view. As a liability of one unit is mirrored in a financial asset of another unit, for instance, they should be identically valued, allocated in time and classified to avoid inconsistencies in aggregating balance sheets of units by sectors or for the total economy. The same is also true for all transactions and other flows that affect balance sheets of two counterparties.

### Valuation

#### General rules

3.40 The underlying principle of valuation in the system of national accounts is that all entries are recorded, in money terms, at the exchange value current during the accounting period, i.e. the value at which flows and stocks are, or could be, exchanged for cash (including transferable deposits). The system does not attempt to determine the utility of the flows and stocks within its scope.

3.41 When goods and services are exchanged for cash or its equivalent, the required values are directly available. In addition, values are directly observable for flows and stocks that concern financial instruments, such as cash holdings or liabilities. The majority of flows and stocks in the national accounts fall into these categories.

3.42 In other cases, where no actual exchange values are available, the preferred method of valuation is by reference to the market value of similar goods, services or assets. This method is used to estimate the value of the services of owner-occupied dwellings, and of 'backyard' production by households for their own use.

3.43 When no prices for similar products exist, it may be necessary to value goods or services by the amount that it costs to produce them. This is the case for most non-market goods and services produced by general government units and non-profit institutions serving households.

3.44 For some assets, it is necessary to estimate a value by writing down (depreciating) the initial acquisition costs. The value of such assets at a given point in their life is equal to their acquisition cost less the accumulated value of these write-downs. Typically, the current value of fixed assets is estimated by writing down current market prices for the accumulated consumption of fixed capital.

3.45 Where none of the above valuation methods is feasible, flows and stocks can be recorded at the net present value of expected future returns. This method is not generally recommended, as it involves a number of

assumptions and the possibility of substantial future revisions to estimates. However, 2008 SNA recognises that it is the most appropriate method of valuation in circumstances where returns from assets are either delayed (as is the case with timber plantations) or spread over a lengthy period (as for subsoil assets).

3.46 Flows and stocks concerning foreign currency are converted to their value in national currency at the exchange rate prevailing when the transaction or flow takes place, or in the case of balance sheet items, the date to which the balance sheet applies. The exchange rate used for conversion to national currency is the mid-point between the buying and selling rate, so as to exclude any implicit foreign exchange service charge.

3.47 Valuations contained in business accounts, tax returns and other administrative records, which are widely used sources of data for national accounts purposes, often do not conform to the national accounting valuation standard. This is especially so in the case of depreciation, where rates of depreciation for tax purposes normally deviate from those underlying the national accounting concept of the consumption of fixed capital. In particular, depreciation for tax purposes is based on the historical cost of the assets whereas consumption of fixed capital in the national accounts is based on the current cost of the assets involved.

3.48 In some cases, invoice values may not accord with prices paid in the market for similar items. Where transactions are between affiliated enterprises under common management, the prices adopted for bookkeeping purposes - referred to as transfer prices - may not correspond to prices that would be charged to independent parties. By using artificially high or low prices, transfer pricing could be used as a device for shifting profits among enterprises within a group for taxation (or other) purposes. In principle, such transactions should be identified and re-valued if they are likely to affect significantly the interpretation of the accounts. Instances of transfer pricing are difficult to identify, and subsequently adjust for. In the ASNA, transactions prices are used as there is no current data on transfer pricing.

3.49 To maximise concordance with 2008 SNA accounting rules, surveys of businesses conducted by the ABS request data, where possible on a national accounts basis. Adjustments are made to source data that are not recorded on the required basis.

### Special valuations concerning products

3.50 The producer and the user of a given product usually perceive its value differently, because of intervening transport costs, trade margins, taxes and subsidies on products. In order to keep as close as possible to the views of the transactors, 2008 SNA recommends that outputs of products be valued at basic prices, while inputs, or final purchases, should be valued at purchasers' prices.

3.51 The basic price is the amount receivable by the producer from the purchaser for a unit of a good or service, minus any tax payable (including deductible value added taxes such as the GST) plus any subsidy receivable, as a consequence of production or sale of the unit. Subsidies artificially reduce the sale price, so they are included in the basic price to obtain a measure of the true value of the goods or services produced. Taxes on products, if included, would artificially increase the price, and so are deducted. The basic price also excludes any transport charges invoiced separately by the producer. The basic price therefore measures the amount retained by the producer in respect of the good or service that is produced as output.

3.52 The major output of the wholesale and retail trade industries is the value of the service provided in selling goods (i.e. goods purchased and resold are not treated as part of intermediate consumption). The value of the service is equal to the trade margins realised on the goods sold. The measurement of this service at basic prices is analogous to that for goods producing industries: output at basic prices is the value of the trade margins, including the value of any subsidies received by the wholesaler or retailer, and excluding taxes on production of the service.

3.53 The purchaser's price is the amount paid by the purchaser in order to take delivery of goods or services. Purchasers' prices include any taxes payable (less any subsidies receivable) on production and imports, and any transport charges paid separately by the purchaser to take delivery of goods. Value added taxes, such as the GST, are included in purchasers' prices unless they are allowable as deductions from the purchaser's value-added tax liability. Purchasers' prices are also referred to as market prices.

3.54 Imports and exports of goods are valued free-on-board (f.o.b.), i.e. at the exporter's customs frontier.

3.55 The ASNA follows the 2008 SNA recommendations with respect to the valuation of products: in the I-O tables and the associated measures of value added by industry, gross output is measured at basic prices and intermediate inputs are measured at purchasers' prices. Expenditure items are recorded at purchasers' prices. Imports and exports of goods are valued f.o.b. Details of other aspects of the valuation of imports and

exports are contained in *Balance of Payments and International Investment Position, Australia: Concepts, Sources and Methods* (cat. no. 5331.0).

### Valuation of other flows

3.56 For the valuation of the other changes in the volume of assets, it is usual to take the value of the asset before and after the change in volume and then to take the difference that is not explained by any transaction as the value of the other change.

3.57 Holding gains and losses accrue continuously and apply to both non-financial and financial assets and liabilities. In general, they are estimated by deducting from the total change in the value of assets those that can be attributed to transactions and to other changes in volumes. Since most financial assets are matched by liabilities, either within the domestic economy or with the rest of the world, it is important that holding gains in one are matched by holding losses in the other and vice versa.

### Valuation of positions of financial assets and liabilities

3.58 Stocks of financial assets and liabilities should be valued as if they were acquired in market transactions on the balance sheet reporting date (or on the closest preceding date if the markets are closed on that date). Valuation according to market-value equivalent is needed for valuing financial assets and liabilities that are not traded in financial markets or are traded only infrequently. For these assets and liabilities, it will be necessary to estimate fair values that, in effect, approximate market prices. The present value of future cash flows can also be used as an approximation to market prices, provided an appropriate discount rate can be used.

## Time of recording

3.59 Flows in the national accounting system are ideally recorded on an *accrual basis.* Accrual accounting records flows at the time economic value is created, transformed, exchanged, transferred or extinguished. Accrual accounting enables the profitability of productive activities to be evaluated without the disturbing influences of leads and lags in cash flows, and net worth to be calculated correctly at any given point. In terms of entries in the national accounts this means that:

- flows which imply a change of ownership are entered when legal ownership changes (this applies to financial assets as well as goods);
- services are recorded when provided;
- distributive transactions, such as compensation of employees, interest, rent on land, and social contributions and benefits are recorded in the period during which the amounts payable are built up. Interest on debt is recorded in the accounting period in which it accrues, regardless of whether or not it is actually paid in that period;
- output is recorded at the time products are created (not when paid for by a purchaser); and
- intermediate consumption is recorded in the period when the materials are used.

#### *Change of ownership*

3.60 In transactions involving the purchase of goods, accrual accounting usually arises naturally from the nature of the transaction. When goods are exchanged for financial assets (e.g. cash), accounting entries reflecting the change of ownership will be recorded at the same time for both the seller and the purchaser. However, the identification of the time of change of ownership is not always straightforward where exports and imports are concerned. In the absence of sources specifying the date of change of ownership, the time at which goods cross the frontiers of countries concerned (obtained from customs records) is usually taken as a proxy for this date. However, for certain exports and imports timing adjustments are made where supplementary information is available to more accurately reflect the time that ownership changes.

3.61 To accord with accrual accounting principles, transactions in financial assets should also be recorded on a change of ownership basis. Financial transactions are shown in the ASNA in the financial accounts.

*Services*

3.62 Services are to be recorded when they are provided. While in most cases this is straightforward, there are types of services that require special treatment. The main types falling into this category are insurance, where the payments of premiums are made in advance, and housing, where the services provided by home ownership are continuous. In the ASNA, provisions are made to account for the services of insurance and housing in each accounting period.

*Distributive transactions*

3.63 Distributive transactions can be difficult to record on an accrual basis, as the accounting practices of the units involved are not always consistent with national accounting requirements. The most important item (in terms of size) affected in this way in the ASNA is wages and salaries, a component of compensation of employees. In addition, provisions for employee entitlements which qualify as liabilities should also be included, rather than the cash payments of these entitlements. Such liabilities include provisions for long service leave and annual leave, and contributions by employers to unfunded superannuation schemes. Interest on debt is recorded in the period during which the interest accrues. Dividend levels, however, are not unambiguously attributable to a particular earning period, and are therefore recorded when they are declared payable.

*Output, intermediate input, changes in inventories, and consumption of fixed capital*

3.64 The principle of recording on an accrual basis implies that output is recorded over the period in which the process of production takes place, and the intermediate consumption of goods or services is recorded at the time when the goods or services enter the process of production. Additions to inventories are recorded when products are purchased, produced or otherwise acquired, and deductions from inventories are recorded when products are sold, used up as intermediate consumption or otherwise relinquished.

3.65 In general, the collection methods used in the ASNA result in estimates on an accrual basis, although the extent to which this is possible depends upon the information received from the respondents to ABS economic statistics collections. Consumption of fixed capital is a cost which accrues over the whole period the fixed asset is available for productive purposes. The apportioning to accounting periods depends on the rate of depreciation used to estimate the using up of the asset. To be consistent with other entries in the accounts, consumption of fixed capital must be valued at the prices prevailing during the current accounting period (unlike depreciation for tax purposes, which is based on the historical cost of the assets).

*Other flows*

3.66 Other changes in the volume of assets are usually discrete events that accrue at precise moments or within fairly short periods of time (e.g. assets being destroyed in a natural disaster such as a bush fire).

*Holding gains and losses*

3.67 Changes in prices often have a more continuous character, particularly in respect of assets for which active markets exist. In practice, nominal holding gains or losses will be computed between two points in time:

1. The moment at which:

- The accounting period begins; or
- Ownership is acquired from other units (through purchase or a transaction in kind); or
- An asset is produced; and

2. The moment at which:

- The accounting period ends; or
- The ownership of an asset is relinquished (through sale or a transaction in kind); or
- An asset is consumed in the production process.

*Timing adjustments for international transactions*

3.68 Differences in the time of recording by partner economies may occur due to various factors. One of the intrinsic problems with recording international transactions is the difference in time zones as well as from delays in mail deliveries or settlement clearing processes. In most cases, data at some aggregate level rather than individual records are used in the compilation of international accounts. Several data sources may often only approximate the required basis. It is important to make timing adjustments where there are major divergences from the required basis.

## Aggregation, netting and consolidation

### Aggregation

3.69 The vast number of individual transactions, other flows and assets within scope of the national accounts have to be arranged in a manageable number of analytically useful groups. Such groups are formed by crossing two or more classifications. For example, the classification of institutional sectors or industries is crossed with the classification of transactions, other accumulation entries or assets. In addition, incomes need to be distinguished from uses and assets from liabilities.

### Netting

3.70 Individual units or sectors may have the same kind of transaction both as a receivable and as a payable (e.g. they both pay and receive interest) and the same kind of financial instrument as both an asset and a liability. Where all the items are shown at their full values, the recording is on a gross basis. Where the values of some items are offset against items on the other side of the account, or against items which have an opposite sign, the recording is on a net basis. Gross recording is applied in most cases, except where a degree of netting is inherent in the classifications themselves. Within the ASNA, an example of net recording is the aggregate for changes in inventories. Rather than record all individual additions to and withdrawals from inventories, the resulting overall changes are recorded in order to show the final effect on gross capital formation. Similarly, the financial accounts record increases in assets and liabilities on a net basis (i.e. acquisitions and disposals are offset) to bring out the final consequences of these types of flows at the end of the accounting period.

### Consolidation

3.71 Consolidation refers to the elimination of transactions which occur between two transactors belonging to the same institutional sector or subsector. Consolidation within sectors or subsectors can be useful for the kinds of analysis which focus on the interactions between (sub)sectors of the economy and between resident sectors and the rest of the world, where the overall final position is more significant than the details of gross transactions within sectors. Consequently, in the sector income, capital and financial accounts, transfer flows are generally consolidated. Likewise, the national income, capital and financial accounts are prepared on a consolidated basis. However, in some parts of the national accounts, such as the I-O tables, non-consolidation is the general rule.

# CHAPTER 4 INSTITUTIONAL UNITS AND SECTORS

## INSTITUTIONAL UNITS

### Institutional units

4.1 In any economy, economic activity is undertaken by a variety of transactors. Corporations (both financial and non-financial), government units, households and non-profit institutions all engage in economic activity, but their economic objectives, functions and behaviour differ. For example,

- Corporations are created for the purpose of producing goods or services for the market at economically significant prices, usually as a source of profits for the units that own them. They undertake either production or accumulation (or both) but do not undertake final consumption. They are divided between those mainly providing financial services and those mainly proving goods and non-financial services.
- Non-profit institutions (NPIs) are created for the purpose of producing or distributing goods or services but not for the purpose of generating income or profits for the units that control or finance them. They are diverse in nature with some behaving like corporations, some are effectively part of general government and some undertake activities similar to general government but independent of it.
- Government units organise and finance the provision of non-market goods and services to individual households and the community at large, mainly financed out of taxation revenue. They are also concerned with the distribution and redistribution of income and wealth in accordance with government policies. They undertake production (but mainly of a different type from corporations), accumulation and final consumption on behalf of the population.
- Households are primarily consumer units, although they may also engage in production (i.e. the operation of unincorporated enterprises) and accumulation.

4.2 Grouping transactors with similar objectives and types of behaviour into sectors enhances the usefulness of national accounts for purposes of economic analysis. For such purposes, 2008 SNA defines transactor units, called institutional units, and groups them into institutional sectors and subsectors.

4.3 An institutional unit is defined in 2008 SNA as:

"*4.2 … an economic entity that is capable, in its own right, of owning assets, incurring liabilities and engaging in economic activities and in transactions with other entities.*"

4.4 An institutional unit is one that is able to:

- own or exchange goods and assets in its own right;
- make economic decisions and engage in economic activities for which it is held directly responsible and accountable at law;
- enter into contracts and incur liabilities on its own behalf; and
- compile, or is able to compile, a complete set of accounts, including a statement of financial position (i.e. a balance sheet of assets and liabilities).

4.5 In some instances it is statistically advantageous to recognise as separate institutional units some entities which do not meet the above criteria. Although these units do not exist as separate institutional units from their owners, and therefore are not institutional units in their own right, where they operate autonomously and keep a full set of accounts, notional institutional units are created to enable the collection of their economic activity.

4.6 2008 SNA identifies two main types of units that may qualify as institutional units: (i) households and (ii) legal or social entities whose existence is recognised by law or society, independently of the persons or other entities that may own or control them.

### Households

4.7 A household is a group of persons who share the same living accommodation, who pool some, or all, of their income and wealth and who consume certain types of goods and services collectively, mainly housing and food. Many assets are owned, or liabilities incurred, jointly by members of the same household, and income received by individual members may be pooled for the benefit of all members. In addition, many expenditure decisions may be made collectively for the household as a whole. As a result of these circumstances, it is not usually possible to draw up meaningful accounts for individual household members. The individual members of multi-person households are therefore not treated as separate institutional units; rather, the household is treated as the institutional unit.

4.8 As well as individual households, there are units described as institutional households that comprise groups of persons staying in hospitals, retirement homes, convents, prisons, etc. for long periods of time.

4.9 An unincorporated enterprise that is entirely owned by one or more members of the same household is treated as a part of that household and not as a separate institutional unit, except when the enterprise is treated as a 'quasi-corporation'.

### Legal or social entities

4.10 The second type of institutional unit is a legal or social entity that engages in economic activities and transactions in its own right. 2008 SNA identifies three main types of legal and social entities: corporations, non-profit institutions and government units. In addition, some unincorporated enterprises belonging to households or government units behave in much the same way as corporations and are treated as quasi-corporations when they have complete sets of accounts. In the system, quasi-corporations are treated in the same way as corporations.

4.11 Corporations are defined in 2008 SNA as entities that are:

*"4.38 … a. capable of generating a profit or other financial gain for their owners;*

*b. recognised at law as separate legal entities from their owners who enjoy limited liability; and*

*c. set up for purposes of engaging in market production."*

4.12 This implies a broader definition than just the legal sense (i.e. legally constituted corporations) as also included will be co-operatives, limited liability partnerships, notional resident units and quasi-corporations.

4.13 Legally constituted corporations are created for the purpose of producing goods or services for the market that may be a source of profit or other financial gain to their owners and are collectively owned by shareholders who have the authority to appoint directors responsible for general management.

4.14 Co-operatives are set up by producers for purposes of marketing their collective output. The profits of such co-operatives are distributed in accordance with their agreed rules and not necessarily in proportion to shares held, but effectively they operate like corporations. Similarly, partnerships whose members enjoy limited liability are separate legal entities that behave like corporations. In effect, the partners are at the same time both shareholders and managers.

4.15 A quasi-corporation is an unincorporated enterprise owned by a resident institutional unit that has sufficient information to compile a complete set of accounts and is operated as if it were a separate corporation and whose de facto relationship to its owner is that of a corporation to its shareholders. Also included is an unincorporated enterprise owned by a non-resident institutional unit that is deemed to be a resident institutional unit because it engages in a significant amount of production in the economic territory over a long or indefinite period of time and is subject to the income tax laws, if any, of the economy in which it is located even if it may have a tax-exempt status. Such a unit is termed a branch in 2008 SNA.

4.16 A notional resident unit is an artificial unit created if a non-resident unit is the legal owner of immovable assets such as land and other natural resources, and buildings and structures. The only exception is made for land and buildings in extra-territorial enclaves of foreign governments such as embassies, consulates and military bases.

4.17 Two quite different types of units exist that are both often referred to as holding companies. The first is the head office that exercises some aspects of managerial control over its subsidiaries. These may sometimes have noticeably fewer employees, and more at a senior level, than its subsidiaries but it is actively engaged in

production. Such units are allocated to the non-financial corporations sector unless all or most of their subsidiaries are financial corporations, in which case they are treated by convention as financial auxiliaries in the financial corporations sector.

4.18 The type of unit properly called a holding company is a unit that holds the assets of subsidiary corporations but does not undertake any management activities. 2008 SNA states that such units should be classified to the financial corporations sector and treated as captive financial institutions and money lenders even if all the subsidiary corporations are non-financial corporations. However, ASNA deviates from this treatment as holding companies are classified to the sector reflective of the major economic activities of the controlled entities.

4.19 Government units are defined in 2008 SNA as unique types of legal entities established by political processes and having legislative, judicial or executive authority over other institutional units within a defined area. The principal functions of government units are to (i) assume responsibility for provision of goods and services to the community or individual households and to finance their provision out of taxation and other income; (ii) redistribute income and wealth by means of transfers; and (iii) engage in non-market production.

4.20 Government units may engage in productive activity by:

- creating a public corporation whose corporate policy, including pricing and investment, it is able to control;
- creating an NPI that it controls; or
- produce the goods or services itself in a unit it owns but that does not exist as a separate legal entity from the government unit itself.

4.21 Note that the unit in the last example may be treated as a quasi-corporation if the necessary conditions are met, i.e. the unit sets economically significant prices, it is operated and managed in a similar way to a corporation and it has a complete set of accounts.

4.22 Non-profit institutions are defined in 2008 SNA as legal or social entities created for the purpose of producing goods or services whose status does not permit them to be a source of income, profit or other financial gain for the units that establish, control or finance them. In practice, their productive activities are bound to generate either surpluses or deficits but any surpluses they happen to make cannot be appropriated by other institutional units. The articles of association by which they are established are drawn up in such a way that the institutional units that control or manage them are not entitled to a share in any profits or other income they generate. For this reason they are frequently exempted from various kinds of taxes.

4.23 2008 SNA distinguishes two broad types of NPIs: market producers and non-market producers. NPIs are defined to be market producers if they charge prices or fees which have a significant influence on both the amounts producers are willing to supply and the amounts purchasers are willing to buy (i.e. the prices are 'economically significant'). Market NPIs are also defined to include all NPIs serving businesses, except where the NPIs are controlled and mainly financed by government units, in which case they are defined as non-market NPIs. Non-market NPIs provide goods or services either free or at prices or fees that are not economically significant.

4.24 In 2008 SNA, institutional units in their capacity as producers are described as enterprises. The term enterprise may refer to a corporation, a quasi-corporation, an NPI or an unincorporated enterprise. Since corporations and NPIs other than NPISHs are primarily set up to engage in production, the whole of their accounting information relates to production and associated accumulation activities. Government, households and NPISHs necessarily engage in consumption and may engage in production also; indeed government and NPISHs always engage in production and many, but not all, households do. Whenever the necessary accounting information exists, the production activity of these units is separated from their other activities into a quasi-corporation. It is when this separation is not possible that an unincorporated enterprise exists within the government unit, household or NPISH.

### The ASNA equivalent of 2008 SNA institutional units and enterprises

4.25 The units concepts used in the ASNA are based on the units model used for the ABS Business Register. The ABS Business Register is used primarily as a register or frame for the various business surveys run by the ABS. The ABS uses an economic statistics units model on the ABS Business Register to describe the characteristics of businesses, and the structural relationships between related businesses.

4.26 The Australian Business Register (ABR) is the primary source used to identify new businesses and this information flows through to the ABS Business Register. Businesses are included on the ABR when they register with the Australian Taxation Office (ATO) for an Australian Business Number (ABN). The ABN is used as the reference for all dealings between government and business.

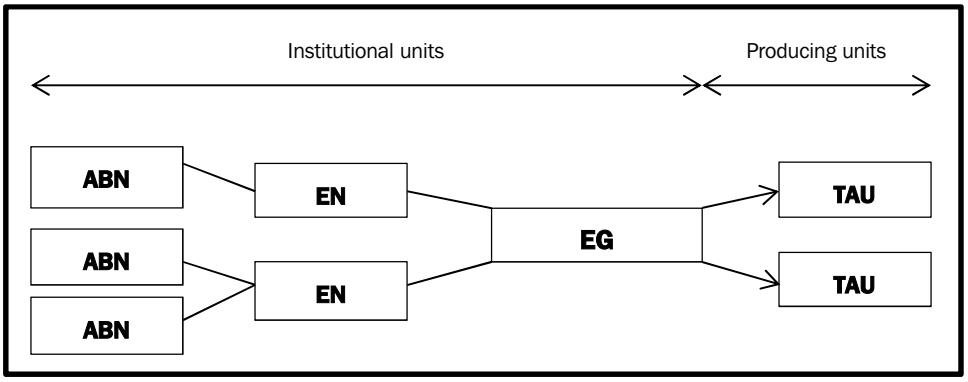
4.27 The ABS Business Register has two populations. The vast majority of businesses are sourced from and maintained by the ATO. The remaining businesses with more complex structures are profiled by the ABS to reflect their organisational structure.

4.28 The units model used by the ABS in determining the structure of businesses is consistent with Australia's Corporations Law and with the definition of institutional units articulated in 2008 SNA. The model consists of the Enterprise Group (EG), one or more Enterprises (ENs) and one or more type of activity unit (TAU). The EN is comprised of one or more Legal Entities (LEs). The EG, EN and LE are institutional units and the TAU is a producing unit.

4.29 ENs and TAUs do not have a universal relationship with each other, e.g. one to one, one to many, many to one. A variety of relationships exist in some of the larger and more complex Australian enterprise groups. The ABS units model does not impose a particular type of relationship on these units for statistical purposes. This is a limited departure from 2008 SNA, which states that there is a hierarchical relationship between institutional and producing units. 2008 SNA states that 'an institutional unit contains one or more entire establishments' and that 'an establishment belongs to one and only one institutional unit' (paragraph 2.41). While many ENs consist of one or more TAUs, there are some cases where this does not occur. In these cases, the 2008 SNA statement will be true at the EG level, but not at the EN level.

4.30 The following diagram illustrates the nature of the relationships between the main unit types in the model. The LE is represented by the ABN in the diagram as they are usually the same.

Figure 4.1 ILLUSTRATION OF UNITS MODEL USED IN ASNA




4.31 A *legal entity* is defined as a unit covering all the operations in Australia of an entity which possesses some or all of the rights and obligations of individual persons or corporations, or which behaves as such in respect of those matters of concern for economic statistics. Examples of legal entities include companies, partnerships, trusts, sole (business) proprietorships, government departments and statutory authorities. Legal entities are institutional units.

4.32 The *enterprise group* is an institutional unit covering all the operations in Australia of one or more legal entities under common ownership and/or control. It covers all the operations in Australia of legal entities which are related in terms of the current Corporations Law (as amended by the *Corporations Legislation Amendment Act 1991*). These may be legal entities, such as trusts and partnerships, as well as companies. Majority ownership is not required for control to be exercised.

4.33 The *enterprise* is an institutional unit comprising a single legal entity, or a grouping of legal entities, within an enterprise group, classifiable to the same institutional subsector, as per the Standard Institutional Sector Classification of Australia (SISCA). In general, an enterprise will equate to a single entity, except where groupings of entities align with legal reporting units suitable for ABS purposes e.g. units regulated by the Australian Prudential Regulatory Authority (APRA). Separate entities can be grouped for statistical reporting purposes to form a single enterprise provided they are in the same SISCA subsector and conform to all data collection requirements.

4.34 Whilst the legal entity statistical unit is considered to closely approximate the institutional unit as defined in 2008 SNA there are, however, some differences between the institutional unit and the practices adopted for

the ABS Business Register. The ABS Business Register includes, as legal entity units, individual government departments and authorities and some not for profit institutions (e.g. church parishes) that have registered for an ABN that do not meet the definition for recognition as separate institutional units.

4.35 The ABS Business Register also recognises unincorporated businesses (e.g. sole proprietorships, partnerships, family trusts) that are owned/operated by one or more households and have registered for an ABN as legal entities.

## RESIDENCE

4.36 The ASNA records the economic activity and wealth of resident institutional units. The residence of each institutional unit is the economic territory with which it has the strongest connection, in other words, its centre of predominant economic interest. This concept is consistent with both 2008 SNA and BPM6. Some key features are as follows:

- the geographic territory under the effective control of the Australia's government;
- any islands belonging to Australia which are subject to the same fiscal and monetary authorities as the mainland;
- the land area, airspace, territorial waters, and continental shelf lying in international waters over which Australia enjoys exclusive rights or over which it has, or claims to have, jurisdiction in respect of the right to fish or to exploit fuels or minerals below the sea bed; and
- territorial enclaves in the rest of the world (that is, geographic territories situated in the rest of the world and used, under international treaties or agreements, by general government agencies of the country). Territorial enclaves include embassies or consulates, military bases, scientific stations, etc. It follows that the economic territory of Australia does not include the territorial enclaves used by foreign governments which are physically located within Australia's geographical boundaries.

4.37 Specifically, the economic territory of Australia consists of geographic Australia including Cocos (Keeling) Islands and Christmas Island, Norfolk Island, Australian Antarctic Territory, Heard Island and McDonald Islands, Territory of Ashmore Reef and Cartier Island and Coral Sea Islands. However, due to administrative complexities and measurement difficulties, Norfolk Island transactions will not always be captured. Most transactions involving Norfolk Island are not material to Australia's overall economic performance, however, any significant transactions will be identified and included in the relevant statistics.

4.38 The Joint Petroleum Development Area (JPDA) is an area within the Timor Sea over which both Australia and East Timor claim 100% sovereignty. There are no defined political or maritime boundaries which could be used to determine the economic territory of both countries. Consequently, the JPDA is treated as a multi-jurisdictional area, without either country having a predominant claim from a jurisdictional perspective. In recording Timor Sea economic activity in Australia's economic statistics each aspect of activity, e.g. production, income and net worth, was considered separately with a focus on the particular units involved and the underlying economic measurement principles.

4.39 An institutional unit is said to have a centre of predominant economic interest in an economic territory when there exists some location within the country's economic territory on, or from which, the unit engages on a continuing basis in economic activities and transactions on a significant scale, either indefinitely or for a finite but long period of time (generally defined as one year or more). From this definition it follows that short-term production of goods or services undertaken by an Australian enterprise abroad, for example installation of equipment, can be treated as part of the GDP of Australia (and classified as exports of goods or services from Australia).

4.40 In addition, ownership of land or buildings within the economic territory of a country is deemed to give the owner a centre of economic interest in that country. Therefore all land and buildings are owned by residents. If the centre of predominant economic interest of the non-resident owner of land or buildings remains outside the country where the property is located, the land or buildings are considered to be foreign direct investment enterprises owned and controlled by the non-residents. Any rents paid by the tenants of such land or buildings are deemed to be paid to the foreign direct investment enterprise, which in turn makes a transfer of property income to the actual non-resident owner.

4.41 In general, an institutional unit is resident in one and only one economic territory determined by the unit's centre of predominant economic interest. An exception is made for multi-territory enterprises that operate a seamless operation over more than one economic territory i.e. it is run as an indivisible operation with no

separate accounts or decisions. Such enterprises are typically involved in cross-border activities and include shipping lines, airlines, hydroelectric schemes on border rivers, pipelines, bridges, tunnels and undersea cables. If it is not possible to identify a parent or separate branches, it is necessary to prorate the total operations of the enterprise across the individual economic territories.

4.42 Individual members of households who leave the economic territory of a country and return after a limited period (less than one year) continue to be regarded as residents of that country. For example, a member of a resident Australian household who travels abroad for recreation, business, health or other purposes and returns within one year is treated while abroad as a resident of the Australian economy for national accounts (and balance of payments) purposes. Therefore, in the ASNA, any consumption expenditure undertaken abroad is considered to constitute an import of goods or services. An exception to the one year rule is made in the case of students and medical patients. Students are treated as residents of their country of origin, however long they study abroad. Medical patients abroad are also treated as residents of their country of origin, even if their stay is one year or more.

4.43 Individuals travelling to other countries for seasonal work, and those who cross country borders frequently for work purposes only, also remain residents of their original economic territory. This also applies to locally recruited staff of foreign embassies, consulates, military bases etc., and the crews of ships, aircraft or other mobile equipment (such as drilling rigs) operating wholly or partly outside the economic territory. The staff of international organisations who work within the enclaves of those organisations are treated as residents of their country of origin if they work for less than one year. If they work with the international organisation for more than one year they are treated as residents of the host country of the international organisation's enclave.

4.44 Unincorporated enterprises that are not quasi-corporations are not separate institutional units from their owners and, therefore, have the same residence as their owners. Corporations and NPIs are normally expected to have a centre of predominant economic interest in the country in which they are legally constituted and registered. Corporations may be resident in countries different from their shareholders and subsidiary corporations may be resident in countries different from their parent corporations. When a corporation, or unincorporated enterprise, maintains a branch, office or production site in another country in order to engage in production over a long period of time (usually taken to be one year or more) but without creating a subsidiary corporation for the purpose, the branch, office or site is considered to be a quasi-corporation (that is, a separate institutional unit) resident in the country in which it is located.

4.45 International organisations established by international agreement (such as the United Nations) are accorded sovereign status, with their own economic territory consisting of the land and structures used by the organisation in the countries where they are physically located. International organisations are therefore not resident units of any country and all transactions with them are treated as transactions with non-residents.

## INSTITUTIONAL SECTORS

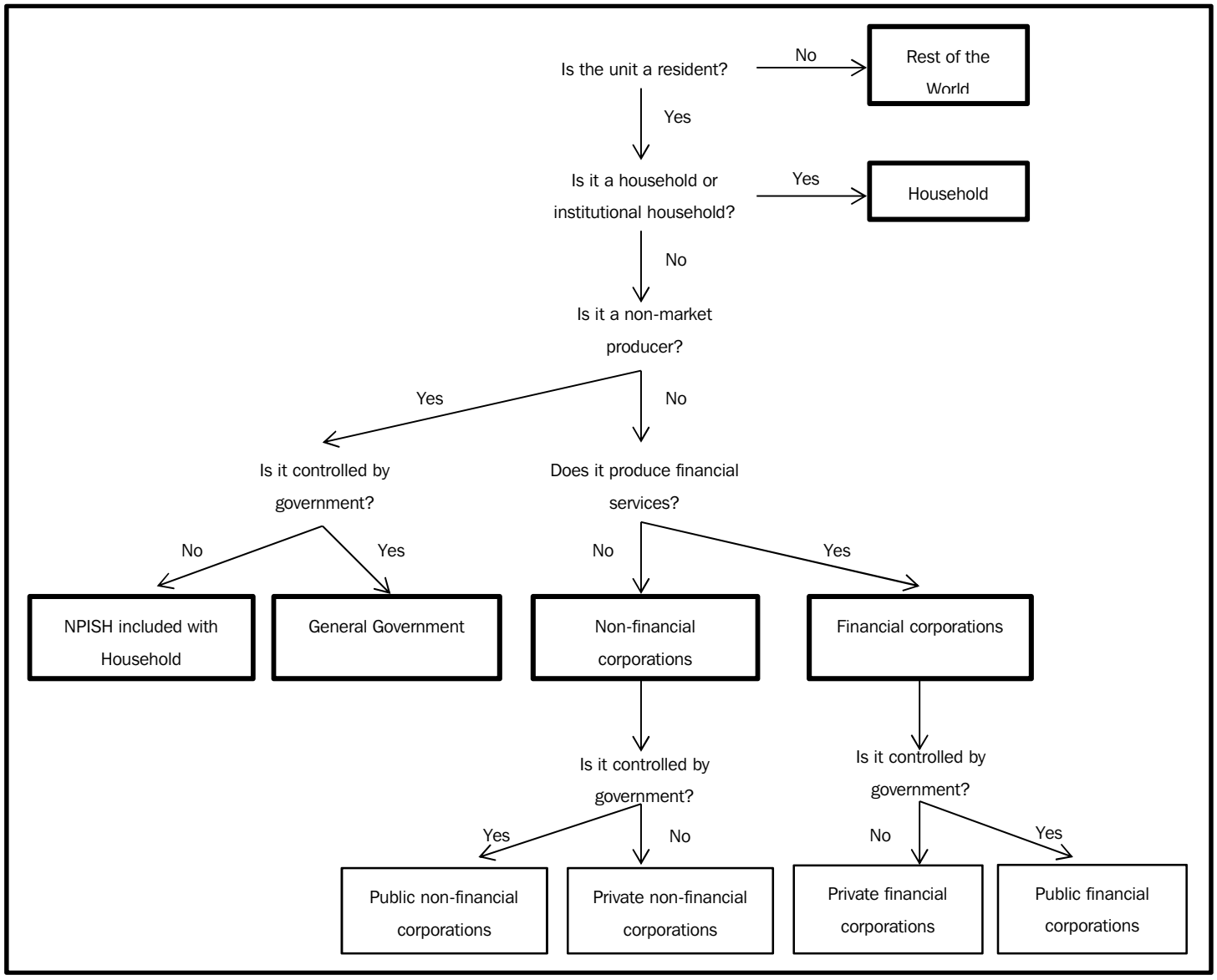
4.46 The institutional sectors of the 2008 SNA group together similar kinds of institutional units. Corporations, NPIs, government units and households are intrinsically different from each other in that their economic objectives, functions and behaviour are different. Institutional units are allocated to a sector according to the nature of the economic activities they undertake. The three basic economic activities recorded in 2008 SNA are production of goods and services, consumption to satisfy human wants or needs, and accumulation of various forms of capital.

4.47 2008 SNA groups institutional units with similar functions into the following institutional sectors:

- the non-financial corporations sector;
- the financial corporations sector;
- the general government sector;
- the household sector; and
- the non-profit institutions serving households sector (NPISH).

4.48 The figure below shows the 2008 SNA allocation of types of institutional units to institutional sectors. The same allocation rules are followed in the ASNA. However, in the ASNA the NPISH sector is combined with the household sector.

Figure 4.2 ILLUSTRATIVE ALLOCATION OF INSTITUTIONAL UNITS TO INSTITUTIONAL SECTORS




4.49 The sectors of the total economy and the rest of the world are highlighted. Once non-resident units and households are set aside, only resident legal and social entities remain. Three questions determine the sectoral allocation of all such units. The first is whether the unit is a market or non-market producer. This depends on whether the majority of the unit's production is offered at economically significant prices or not.

4.50 The second question determining sectoral allocation applies to non-market units, all of which, including non-market NPIs, are allocated either to general government or to the NPISH sector. The determining factor is whether the unit is part of, or controlled by, government.

4.51 The third question determining sectoral allocation applies to market units, all of which, including market NPIs, are allocated to either the non-financial corporations sector or the financial corporations sector.

## Non-financial corporations sector

4.52 The non-financial corporations sector consists of all resident corporations, notional institutional units and quasi-corporations that are principally engaged in the production of market goods and/or non-financial services, and holding companies with mainly non-financial corporations as subsidiaries. It includes resident non-financial corporations irrespective of the residence of their shareholders, and quasi-corporations (including branches of foreign owned non-financial enterprises that are engaged in significant production in the economic territory on a long-term basis), non-profit institutions that are market producers of goods or non-financial services and investment funds investing in predominantly non-financial assets such as infrastructure and property.

4.53 2008 SNA identifies three subsectors within the non-financial corporations subsector:

1. *Public non-financial corporations* are resident non-financial corporations or quasi-corporations that are government owned or controlled.
2. *National private non-financial corporations* are resident non-financial corporations or quasi-corporations that are not controlled by government or non-resident institutional units. Market NPIs are included in this subsector.
3. *Foreign controlled non-financial corporations* are resident non-financial corporations or quasi-corporations that are controlled by non-resident institutional units.

4.54 The latter two subsectors are not distinguished in the ASNA. The disaggregation in ASNA is:

- Public non-financial corporations; and
- Private non-financial corporations.

4.55 Public non-financial corporations are further dissected into National; and State and Local subsectors.

4.56 Private non-financial corporations are further dissected into non-financial investment funds and other private non-financial corporations. The inclusion of non-financial investment funds into the non-financial corporations sector is a departure from 2008 SNA which includes all non-money market investment funds in the financial corporations sector. Non-financial investment funds invest in non-financial assets, usually real estate.

## Financial corporations sector

4.57 The financial corporations sector consists of all resident corporations, notional institutional units and quasi-corporations and market NPIs that are principally engaged in financial intermediation or in auxiliary financial activities. Financial corporations are distinguished from non-financial corporations because of their different roles in the economy, and the inherent differences in their respective functions and activity. Financial corporations are mainly engaged in financial market transactions, which involve incurring liabilities and acquiring financial assets, i.e. borrowing and lending money, providing superannuation, life, health or other insurance, financial leasing or investing in financial assets. In this process, the corporations are not acting as agents, but rather place themselves at risk by trading in financial markets on their own account. Financial auxiliaries are also classified to the financial corporations sector. They include stockbrokers, insurance brokers, investment advisers, trustees, custodians and nominees, mortgage originators and other entities that are engaged in providing services closely related to financial intermediation even though they do not intermediate themselves.

4.58 Subsectors of the financial corporations sector identified in ASNA are:

- *Central Bank* – in Australia's case this is the Reserve Bank of Australia (RBA).
- *Depository corporations* – consist of all resident financial corporations and quasi-corporations, except the central bank, that are principally engaged in financial intermediation and have liabilities in the form of deposits or financial instruments that are close substitutes for deposits such as short-term certificates of deposits. This subsector is dissected into:
  - Banks; and
  - Other depository corporations.

- *Pension funds and insurance corporations* – consist of all funds that provide retirement benefits for specific groups of people and all corporations that provide life and other insurance cover, including reinsurance services. This subsector is dissected into:
    - Pension funds;
    - Life insurance corporations; and
    - Non-life insurance corporations.
- *Financial investment funds* – these are collective investment schemes that raise funds by issuing shares or units to the public and the proceeds are invested primarily in financial assets. This subsector is dissected into:
    - Money market funds (MMF)– which invest in transferable debt instruments with a residual maturity of no more than one year, bank deposits and instruments that pursue a rate of return that approaches the interest rates of money market instruments; and
    - Non-money market financial investment funds (NMMF) – which invest in financial assets other than short-term assets.
- *Central Borrowing Authorities (CBAs)* – are captive financial institutions established by each State and Territory government to primarily provide finance for public corporations and notional institutional units and other units owned or controlled by the government. They raise funds predominantly by issuing securities, and arrange the investment of these unit's surplus funds and participate in the financial management activities of the parent government.
- *Securitisers* – are financial intermediaries that pool various types of assets such as residential mortgages, commercial property loans and credit card debt, and package them as collateral to issue bonds or short-term debt securities, referred to as asset backed securities.
- *Other financial corporations* – include other financial intermediaries, financial auxiliaries, money lenders and other captive financial institutions described as follows:
    - Other financial intermediaries – includes housing finance schemes established by State and Territory governments; economic development corporations owned by government to fund infrastructure developments;
    - Financial auxiliaries – units engaged in activities closely related to financial intermediation but which do not themselves perform an intermediation role i.e. the auxiliary does not take ownership of the financial assets and liabilities being transacted. The types of corporations included are insurance brokers, loan brokers, investment advisors, managers of pension funds, securities brokers, etc.;
    - Money lenders – units providing financial services where most of their assets and liabilities are not transacted on the open markets, for example pawnshops that predominantly engage in lending; and
    - Other captive financial institutions – units characterised by having a balance sheet holding financial assets on behalf of other companies. These institutions are usually legal entities such as corporations, trusts or partnerships established for a specific or limited purpose, e.g. to hold the assets of a group of subsidiary corporations.

4.59 The Financial Accounts publication (cat. no. 5232.0) provides a further sectorial breakdown of non-financial corporations into public and private, with the public sector dissected into National; and State and Local subsectors, and private sector dissected into non-financial investment funds and other private non-financial corporations.

### General government sector

4.60 The general government sector consists of government units and non-market NPIs that are mainly financed and controlled by government. The general government sector includes all government departments, offices and other bodies mainly engaged in the production of goods and services outside the normal market mechanism for consumption by government itself and the general public. The units' costs of production are mainly financed from public revenues and they provide goods and services to the general public, or sections of the general public, free of charge or at nominal charges well below costs of production. The sector includes government enterprises mainly engaged in the production of goods and services for other general government units. Also included are NPIs that are serving businesses or households, and are composed largely of private sector members but are mainly financed and controlled by governments.

4.61 Subsectors within the general government sector in ASNA are:

- National; and
- State and Local.

4.62 Public universities are treated as non-market NPIs allocated to the general government sector and are included in the National level together with Commonwealth general government.

4.63 Public universities are defined as non-market NPIs on the basis of their funding arrangements. While most public universities were created by State legislation, the bulk of their funding (more than 70 per cent) is received from the Commonwealth government. Approximately 20 per cent of the remaining funding is accounted for by the Higher Education Contribution Scheme (HECS) fees, with only around 10 per cent accounted for by fees for overseas students, post-graduate students and entrepreneurial activity. They are allocated to the government sector on the basis that, while no Australian government is able to control universities in the sense of being able to appoint their managing officers, it is clear that the Commonwealth government is able to exercise a significant degree of control through its funding power.

### Household sector

4.64 The household sector consists of all resident households, defined as small groups of persons who share accommodation, pool some or all of their income and wealth and collectively consume goods and services, principally housing and food. Although households are primarily consumers of goods and services, they also engage in other forms of economic activity through their operation of unincorporated enterprises. Such unincorporated enterprises are included in the household sector because the owners of ordinary partnerships and sole proprietorships will frequently combine their business and personal transactions, and complete sets of accounts in respect of the business activity will often not be available.

4.65 The 2008 SNA suggests that the household sector may be divided into subsectors on the basis of the type of income that is the largest source of income for each household or, alternatively, on the basis of other criteria of an economic, socioeconomic or geographical nature. However, in view of differing needs across countries in relation to the analysis of the household sector, 2008 SNA advises that statistical agencies determine the number and nature of subsectors to suit their own purposes. ASNA does not include any further dissection.

### Non-profit institutions serving households sector (NPISH)

4.66 All institutional units of a particular type are grouped together within the same sector with the exception of NPIs. They are classified to various sectors depending on the nature of the NPI. Market NPIs are allocated to either the non-financial corporations sector or the financial corporations sector, depending on which sector they serve. In the case of non-market NPIs, those that are controlled and mainly financed by government units are allocated to the general government sector. Other non-market NPIs (i.e. non-market NPIs not controlled or mainly financed by government) are allocated to the NPISH sector. (Note again the NPISH sector has not been separately identified in the ASNA.)

4.67 The NPISH sector includes the following two main kinds of NPISHs that provide goods or services to their members or to other households without charge or at prices that are not economically significant:

1. organisations whose primary role is to serve their members, such as trade unions, professional or learned societies, consumers' associations, political parties, churches or religious societies, and social, cultural, recreational and sports clubs; and

2. philanthropic organisations, such as charities, relief and aid organisations financed by voluntary transfers in cash, or in kind, from other institutional units.

### Rest of the world

4.68 In addition to accounts for the resident sectors, 2008 SNA includes external (rest of the world) accounts, which provide a summary of all transactions of residents with non-residents (e.g. overseas governments, persons and businesses). The rest of the world consists of all non-resident institutional units that enter into transactions with resident units, or have other economic links with resident units. It is not a sector for which complete sets of accounts have to be compiled, although it is often convenient to describe the rest of the world as though it were a separate sector.

4.69 As discussed in relation to residence, the rest of the world includes institutional units that may be physically located within the geographical boundary of a country, for example, foreign enclaves such as embassies, consulates or military bases, and international organisations that are not treated as resident institutional units.

## Institutional sectors and subsectors in the ASNA

4.70 Institutional sector and associated classifications used in ABS statistics are described in *Standard Economic Sector Classifications of Australia* (SESCA) (cat. no. 1218.0). The classifications included in SESCA are based on international standards, adapted to suit Australian situations where appropriate. The institutional sector classification, the SISCA, is the main classification used for sectoring in the ASNA. For simplicity of presentation, the SISCA excludes the private/public, level of government and foreign controlled distinctions that are part of the 2008 SNA classification of institutional sectors. These distinctions are contained in other classifications within SESCA. The table below shows the domestic institutional sectors and subsectors included in the ASNA. In the ASNA, accounts for the rest of the world are grouped as 'external accounts'. These accounts conform with the 2008 SNA definition of the rest of the world sector.

**DOMESTIC SECTORS AND SUBSECTORS IN THE ASNA**

| SECTORS | SUBSECTORS |
|---|---|
| Non-financial corporations | Private |
| | Private non-financial investment funds |
| | Other private non-financial corporations |
| | Public |
| | National |
| | State and local |
| Financial corporations | Central Bank |
| | Depository corporations |
| | Banks |
| | Other depository corporations |
| | Pension funds and insurance corporations |
| | Pension funds |
| | Life insurance corporations |
| | Non-life insurance corporations |
| | Financial investment funds |
| | Money market funds |
| | Non-money market financial investment funds |
| | Central Borrowing Authorities |
| | Securitisers |
| | Other financial corporations |
| General government | National |
| | State and local |
| Households (a) | |

(a) Including unincorporated businesses n.e.c., and non-profit institutions serving households.

4.71 With the exception of the combination of the NPISH and household sectors, the ASNA structure corresponds with the structure outlined in 2008 SNA. The subsectors are a combination of 2008 SNA subsectors (adapted to Australian conditions) and other 2008 SNA-compliant classifications from the SESCA, as follows:

- the distinction between the private and public subsectors within the non-financial corporations sector is based on the ABS private/public classification;
- the Commonwealth, State and local, and National subsectors are based on the ABS level of government classification; and
- unlike 2008 SNA, SISCA and the ASNA distinguish Banks from other depository corporations, CBAs from captive financial institutions and securitisers from other financial institutions.

4.72 The National subsector is so named because it includes units that are subject to a degree of control from both Commonwealth and State governments and that cannot be allocated to either a State or Commonwealth subsector. The National subsector therefore includes multi-jurisdictional units in addition to

units that are solely under the jurisdiction of the Commonwealth. At present, public universities are the only multi-jurisdictional institutions that are included in the National subsector.

### Concordance between ASNA and 2008 SNA sector and subsector definitions

4.73 The composition of the ASNA institutional sectors and subsectors accords with 2008 SNA definitions in most cases. Instances where the ASNA's sectoral composition differs from the 2008 SNA guidelines are described in the following paragraphs.

### Non-MMF investment funds

4.74 2008 SNA includes all non-MMF investment funds within the financial corporations sector. However, in ANSA, only those investment funds investing predominantly in financial assets are treated as financial corporations. Those investing in non-financial assets, such as property, are treated as non-financial corporations. This distinction is based on whether the institution's primary income is obtained from rentals, or dividends and interest.

### Quasi-corporations in the non-financial and financial corporations sectors

4.75 One feature of both the non-financial corporations sector and the financial corporations sector is that they are designed to cover businesses which are legally, or clearly act as, entities independent of their owners with regard to their income, consumption and capital financing transactions, and accordingly are required to maintain separate profit and loss and balance sheet accounts. Private enterprises classified to these sectors are mainly companies registered under the Companies Act or other Acts of Parliament but 2008 SNA also recommends that all quasi-corporations be treated as corporations and allocated either to the non-financial corporations or the financial corporations sector. However, in Australia, it is often difficult to distinguish quasi-corporations owned by households where the bulk of quasi-corporations are not presently identifiable from ABS data sources. In the ASNA, unincorporated enterprises identified as quasi-corporations are currently limited to large and easily identified enterprises such as partnerships of companies, unit trusts of companies, credit unions, building societies, branches of overseas corporations, and mutual societies. All sole proprietors, partnerships and trusts of individuals are treated as unincorporated enterprises and are included in the household sector in the ASNA.

### Non-profit institutions serving households (NPISH)

4.76 In the ASNA, the recommendations of 2008 SNA are followed with regard to the sector allocation of NPIs that are market producers and those that are controlled and mainly financed by government units. However, contrary to 2008 SNA recommendations the SISCA does not include separate subsectors within the corporations and general government sectors for NPIs. It will be some time before sufficient data relating to the transactions of NPISHs are available to enable the construction of a full range of sector accounts for NPISHs.

# CHAPTER 5 PRODUCING UNITS, PRODUCTS AND INDUSTRIES

## PRODUCING UNITS

### Introduction

5.1 Institutional units operate in the economy and are grouped into institutional sectors. However, the production activities of institutional units can be diverse and heterogeneous with respect to the types of production processes and goods and services produced by the *producing units* belonging to institutional units. For analyses of production, analysts prefer to work with groups of producing units that are engaged in essentially the same kind of production. Such groups are called industries. Therefore, although institutional units can be allocated to industries, for the compilation of statistics classified by industry the units of interest are the producing units owned by institutional units. Producing units are sufficiently homogeneous, in terms of their range of activities, to enable them to be classified to industry at the required level of industry detail, based on their predominant activity.

5.2 Institutional units in their capacity as producers are described as enterprises. Enterprises can be allocated to industries in accordance with the types of productive activities in which they engage. However, as explained below, an enterprise may engage in both principal and secondary types of productive activity, and large corporations may be involved in many different kinds of productive activity simultaneously, encompassing a wide range of goods and services. Therefore, for the analysis of production classified by industry, it is necessary to partition (or split) enterprises into units that are more homogeneous in terms of the range of productive activities in which they engage. These units are described as type of activity units (TAUs) in ASNA.

5.3 The *principal activity* of a producing unit is the activity with value added that exceeds the value added of any other activity carried out by the same unit. In this context, activities are the kinds of production (based on outputs, inputs, production techniques or output uses) that are defined as the principal activities of each industry in the ISIC, Rev4, published by the United Nations. A *secondary activity* is an activity with value added less than that of the principal activity. To be considered as either principal or secondary activities, the outputs from the activities must be goods or services that are capable of being delivered to other units even though they may be used for own consumption or for own capital formation.

5.4 The output of *ancillary activity* is not intended for use outside the enterprise. Ancillary activity is undertaken within an enterprise to support the principal or secondary activities. Activities which may be classified as ancillary include record keeping; electronic or other forms of communication; purchasing materials and equipment; personnel management; warehousing; transportation; sales promotion; cleaning, repairs and maintenance; security and surveillance. For national accounting purposes, the output of an ancillary activity is not explicitly recognised or recorded, and all inputs to ancillary activities are treated as inputs to the principal or secondary activities that they support. When ancillary activity grows to the point that it has the capacity to provide services outside an enterprise, it is treated as a secondary activity.

### Producing units

5.5 2008 SNA discusses three types of units into which enterprises can be partitioned for the purpose of industry statistics:

1. The kind-of-activity unit - defined as an enterprise, or part of an enterprise, which engages in only one kind of (non-ancillary) productive activity, or in which the principal productive activity exceeds the value added of any other activity carried out by the same unit.

2. The local unit - an enterprise or part of an enterprise that engages in productive activity at, or from, one location.

3. The establishment - a combination of the kind-of-activity and local units and is defined as an enterprise, or part of an enterprise, that is situated in a single location and in which only a single productive activity is carried out or in which the principal productive activity accounts for most of the value added. Although establishments can engage in secondary activities, 2008 SNA recommends that, if the secondary activity is significant, it should be treated as part of another establishment. Examples of establishments are individual farms, mines, quarries, factories, shops, construction sites and airports.

5.6 If an enterprise comprises of only a single establishment, the two units coincide and the production account for the establishment is the same as for the enterprise. However, establishments are conceptually distinct from enterprises, in that an establishment does not engage in transactions on its own account, or incur liabilities, enter contracts and so on. The enterprise which owns the establishment is the unit which engages in these types of activities, and makes the decisions concerning the productive activities of the establishment. It follows therefore that only the production account and generation of income account can be compiled by industry as well as by sector. Consequently, it is feasible to calculate output and intermediate use (and therefore value added), compensation of employees, taxes (and subsidies) on production and imports, and operating surplus/mixed income for an establishment.

5.7 The establishment is designed to facilitate industry analysis, which is concerned with the outputs and inputs to the production processes of enterprises. Information about establishments is used (i) to value commodities produced and goods and services used in production; (ii) to measure industry employment, compensation of employees, operating surplus, changes in inventories and gross fixed capital formation; and (iii) to derive estimates of productivity. The enterprise provides information on the broader functions of an institutional unit engaged in production, enabling production to be classified to institutional sectors.

5.8 The following outlines instances where application of these principles is not so straightforward:

- A horizontally integrated enterprise is one in which several different kinds of activities that produce different kinds of goods or services for sale on the market are carried out simultaneously using the same factors of production. Within the SNA, a separate establishment should be identified for each different kind of activity wherever possible.
- A vertically integrated enterprise is one in which different stages of production, which are usually carried out by different enterprises, are carried out in succession by different parts of the same enterprise. The output of one stage becomes an input into the next stage, with only the output from the final stage being actually sold on the market. Despite the practical difficulties involved in partitioning vertically integrated enterprises into establishments, it is recommended in the SNA that, when a vertically integrated enterprise spans two or more sections of the ISIC, at least one establishment must be distinguished within each section.
- Government units, especially central governments, may be particularly large and complex in terms of the kinds of activities in which they engage.
    - If an unincorporated enterprise of government is a market producer and there is sufficient information available to treat it as a quasi-corporation, it should be treated as a publicly controlled unit in the non-financial or financial corporations sectors as appropriate.
    - If an unincorporated enterprise of government is a market producer and there is insufficient information to treat it as a quasi-corporation, or if the unincorporated enterprise is a non-market producer, then it remains within the general government sector but it should be treated as an establishment in its own right and allocated to the appropriate industry.
    - Non-market producers such as public administration, defence, health and education providing final goods or services should be partitioned into establishments using the ISIC.
- If the activity of a unit undertaking purely ancillary activities is statistically observable, in that separate accounts for the production it undertakes are readily available, or if it is located in a geographically different location from the establishments it serves, it should be recognised as a separate establishment and classified to its own principal activity. This is a change to the treatment in 1993 SNA where ancillary activities related to an individual establishment were treated as an integral part of the costs of the establishment's principal or secondary activities and no separate unit was created. An enterprise may include central ancillary units that carry out ancillary activities for all establishments of the same enterprise.

### The ASNA equivalent of producing units

5.9 The producing unit in the ASNA's units model is the TAU. The TAU is a producing unit comprising of one or more business entities, sub-entities or branches of a business entity that can report production and employment activities via a minimum set of data items. The activity of the unit should be as homogeneous as possible. If accounts sufficient to approximate value added are available at the ANZSIC Subdivision level, a TAU will be formed. Where a business cannot supply adequate data to form a TAU for an individual ANZSIC Subdivision, a TAU will be formed which contains activity in two or more ANZSIC Subdivisions.

5.10 In its simplest form, the TAU relates to the ABN of the business. However, in the case of complex and varied business structures, it may be inappropriate for the TAU to be created to refer to the ABN.

5.11 Ideally, all TAUs are constructed so that two digit ANZSIC homogeneity is observed. This ensures that good quality industry estimates can be calculated by the ABS at that level. However, not all businesses are able to supply a complete set of accounts for every ANZSIC Subdivision in which they have activity.

5.12 Only a small number of data items are required to be available on a quarterly basis. The data items are: total capital expenditure; income from the sale of goods and services; wages and salaries; total inventories; total purchases; and selected expenses. When all of these data items are not available from business accounts, a TAU can still be formed if careful estimates can be provided.

5.13 Where businesses cannot provide the necessary data for separate activities, and if separate activities are being carried out at a significant level (in relation to the known/estimated activity of those industries), the TAU may be a candidate for unit splitting. If it is decided to split the TAU for statistical purposes, two or more new TAUs are formed as the *statistical units* and the former TAU becomes the *reporting unit* i.e. data will be reported by the former TAU for its multiple activities and the ABS will apportion it to the new split TAUs for statistical outputs. The estimates for the split units will be produced using benchmarks determined at the time of splitting.

5.14 TAUs are not created based on any geographic criteria. However, it is necessary to create special State and Territory units for some TAUs in order to accommodate state estimates. This unit is referred to as the TAU State. The TAU State is not stored as a specific unit on the ABS Business Register. Rather, information which allows the TAU State unit to be formed, is stored.

5.15 A business unit's productive activity is described as ancillary when its sole function is to provide common types of services for intermediate consumption within the same enterprise group. These are typically services likely to be needed in most enterprise groups, whatever their principal activities e.g. transportation, purchasing, sales and marketing, various financial or business services, personnel, computing and communications, security, maintenance and cleaning.

5.16 The 2008 SNA treatment of ancillary units is that an establishment should be created where the activity of the unit is statistically observable. The ABS does not currently apply the recommended 2008 SNA treatment to ancillary TAUs, as the treatment cannot be applied to all units on the ABS Business Register.

## PRODUCTS AND INDUSTRIES

### Products

5.17 A product is a good or a service.

5.18 One of the main international standards for the classification of products is the *Central Product Classification, Version 2* (CPC, Ver. 2), which is based on the intrinsic characteristics of the goods or the nature of the services rendered. This results in a classification structure that is different from that used for industries. Its fundamental principle is that the classification combines in one category goods or services that are normally produced in only one industry as defined in ISIC (i.e. industry of origin principle). It covers the production, trade and consumption of all goods and services.

### Industries

5.19 An industry is defined as 'a group of establishments engaged in the same, or similar, kinds of activity'.

5.20 The international standard for the classification of industries is the ISIC, a four-level hierarchical classification, which includes in the same industry grouping all establishments with the same principal activity. It takes into account not only the goods produced and services rendered but also the inputs into the production process and the technology used in the production process.

5.21 A one-to-one correspondence does not exist between activities and products and hence between industries and products. Certain activities produce more than one product simultaneously, while the same product may sometimes be produced by using different techniques of production.

## Products and industries in the ASNA

5.22 TAUs are classified to industries according to the *Australian and New Zealand Standard Industrial Classification, 2006* (ANZSIC06) (cat. no. 1292.0). ANZSIC06 has been developed by the ABS and Statistics New Zealand for use in both countries for the compilation and analysis of industry statistics. To ensure international comparability, ANZSIC06 is aligned as closely as possible with the ISIC Rev 4.

5.23 ANZSIC06 comprises four levels, namely Divisions (the broadest level), Subdivisions, Groups and Classes (the lowest level). TAUs are defined to be homogeneous at the subdivision level.

5.24 Industry statistics in the ASNA are presented on a basis that is consistent with ANZSIC06. Value added is presented on an ANZSIC06 industry basis at the Division level, and also at the Subdivision level for the Agriculture, forestry and fishing, Mining, Manufacturing, Electricity, gas, water supply and waste services and Transport, postal and warehousing industries. A number of income components of the ASNA are also presented on an ANZSIC06 industry basis. Industry data in the S-U tables and I-O tables are classified according to the *Supply-Use Industry Classification* (SUIC) and *Input-Output Industry Group* (IOIG) respectively, which are based on ANZSIC06. While some of the S-U and I-O industries correspond to a single ANZSIC06 industry class, most SUIC and IOIC industries constitute a grouping of similar ANZSIC06 industries. These groupings are formed to enable the S-U tables and I-O tables to present a balanced picture of the structure of the economy while maintaining comparability between the latest published tables and earlier ones.

5.25 Product statistics in the ASNA concord with the CPC, Ver. 2 to at least the 3 digit level. Product data in the S-U tables and I-O tables are classified according to the *Supply-Use Product Classification* (SUPC) and *Input-Output Product Classification* (IOPC) respectively. Both classifications are based on the CPC version 2. While some of the S-U and I-O products correspond to a single SUIC and IOIC respectively, most S-U and I-O industries will consist of a grouping of similar SUPCs and IOPCs.

# CHAPTER 6 PRICE AND VOLUME MEASURES

## INTRODUCTION

6.1 In the Australian economy millions of economic transactions take place every day involving the production and sale of goods and services (products). The monetary value of each of these transactions is a product of the quantity produced or sold and the unit price. In a particular period, the total value of all transactions taking place in an economy is simply the sum of the individual transaction values in that period. This is referred to as the current price value.

6.2 For many purposes, economists and other analysts wish to measure the volume growth of production and expenditures, i.e. growth free of the effects of price change. The current price values are subject to the effects of changing prices and so they are unsatisfactory for these purposes. For example, consider the sale of beef and chicken in the following example:

> In period 1, 20 kilos of beef are sold at $1.00 per kilo for a value of $20.00 and 10 kilos of chicken are sold at $2.00 per kilo for a value of $20.00. Total sales of meat are valued at $40.00.
>
> In period 2, 18 kilos of beef are sold at $1.10 per kilo for a value of $19.80 and 12 kilos of chicken are sold at $2.00 per kilo for a value of $24.00. Total sales of meat are valued at $43.80.

6.3 Total sales of meat have increased from $40.00 in period 1 to $43.80 in period 2. But what is the growth in volume terms? One way of answering this question is to hold prices constant in the two periods, at say period 1 prices. The total value of sales in period 2 at period 1 prices is $42.00 (18 kilos of beef @ $1.00 plus 12 kilos of chicken @ $2.00). At period 1 prices, the total value of meat sales has increased from $40.00 to $42.00, which is an increase of 5%. This can be expressed algebraically as:

$$\frac{p^1_{beef}q^2_{beef} + p^1_{chicken}q^2_{chicken}}{p^1_{beef}q^1_{beef} + p^1_{chicken}q^1_{chicken}} = \frac{(1.00 \times 18) + (2.00 \times 12)}{(1.00 \times 20) + (2.00 \times 10)} = \frac{18.00 + 24.00}{20.00 + 20.00} = \frac{42.00}{40.00} = 1.05$$

6.4 This expression is called a Laspeyres volume index. The defining feature is that in calculating growth from one period to another, the prices of the earlier period are applied to both periods.

6.5 Another way of estimating the volume growth of meat sales is to hold prices constant at period 2 prices. The value of meat sales in period 1 at period 2 prices is $42.00 (20 kilos of beef @ $1.10 per kilo plus 10 kilos of chicken @ $2.00 per kilo). This gives volume growth of 4.3% between the two periods and can be written algebraically as:

$$\frac{p^2_{beef}q^2_{beef} + p^2_{chicken}q^2_{chicken}}{p^2_{beef}q^1_{beef} + p^2_{chicken}q^1_{chicken}} = \frac{(1.10 \times 18) + (2.00 \times 12)}{(1.10 \times 20) + (2.00 \times 10)} = \frac{19.80 + 24.00}{22.00 + 20.00} = \frac{43.80}{42.00} = 1.043$$

6.6 This expression is called a Paasche volume index. The defining feature is that in calculating growth from one period to another, the prices of the later period are applied to both periods.

6.7 Both the Laspeyres and Paasche indexes are equally valid for calculating the volume growth of meat sales between period 1 and period 2, yet they give different answers. This suggests that an average of the two may be a better estimate than either of them. Fisher's Ideal Index (hereafter referred to as the Fisher index) is the geometric mean of the Laspeyres and Paasche and is considered to be a superior index[25].

6.8 Up until the beginning of the twenty first century, most OECD member countries derived volume estimates of aggregates by holding prices constant in a particular base year, i.e. constant price estimates. In effect, constant price estimates are a sequence of Laspeyres indexes from the base year to the current period multiplied by the current price value in the base year. Over time, price relativities change and when estimating volume growth from one period to another it is best to use prices at or about the current period. Both the 1993 and 2008 SNAs recommend the abandonment of constant price estimates in favour of chain

[25] See Chapter 15 of the IMF's *Producer Price Index Manual*

volume estimates. Chain volume estimates are derived by linking together period-to-period indexes, such as Laspeyres, Paasche or Fisher indexes.

6.9 While chain volume estimates are generally superior to constant price estimates in terms of deriving volume growth rates, their use raises a number of issues such as:

- which index formula should be used (Laspeyres, Paasche or Fisher)?
- how frequently should the fixed prices change – quarterly or annual?
- if annually, how should quarterly indexes be derived and how should they be linked together?
- unlike constant price estimates, chain indexes are not generally additive; how should contributions to growth be derived?

6.10 Annex A to this chapter addresses these issues in detail whilst this chapter outlines how volume estimates are actually derived in the ASNA.

6.11 There are two principal steps in deriving volume estimates of national accounts aggregates:

- the derivation of elemental volume indexes at the most detailed level practicable;
- the aggregation of the elemental volume indexes to the desired level, such as GDP.

6.12 The chapter addresses the second step first because it is best to consider the nature of the aggregate volume indexes before describing how the elemental indexes are derived.

## Terminology

6.13 Before proceeding to discuss the aggregation of volume estimates it is necessary to define some of the key terminology to be used in order to minimise the risk of confusion.

6.14 The base period for an elemental volume index is the period for which the prices are fixed. Hence a Laspeyres volume index from time 0 to time t can be written[26] as

$$\frac{q^t p^0}{q^0 p^0}$$

and a constant price estimate can be written as

$$q^t p^0$$

6.15 The Laspeyres volume index is equal to the constant price value for period t divided by the current price value for period 0. When elemental volume indexes are aggregated, the current price values in the base period form the weights for combining the elemental volume indexes.

6.16 The reference period is the period for which an index series is set equal to 100 or the period for which a volume index series may be set equal to the current price value in order to express the index series in terms of currency units.

6.17 For constant price estimates the base period and the reference period coincide. For chain volume indexes there is only one reference period, but there are many base periods.

### CHAIN VOLUME INDEX FORMULAE

6.18 Annual chain volume indexes in the ASNA are derived by compounding successive year-to-year Laspeyres indexes. A Laspeyres volume index from year *y-1* to year *y* is derived by dividing the value of the aggregate in year *y* at year *y-1* prices (i.e. using the volumes in year *y* but the prices of year *y-1*) with the current price value in year *y-1*. That is,

[26] Likewise, a Laspeyres price index can be written as $q^0p^t / q^0 p^0$.

$$L_Q = \frac{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y}}{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}},$$

where $P_i^{y}$ and $Q_i^{y}$ are prices and quantities of the $i^{th}$ product in year $y$ and there are $n$ products.

6.19 Annual chain Laspeyres volume indexes can be formed by multiplying consecutive year-to-year indexes. That is,

$$L_Q^{y} = \frac{\sum_{i=1}^{n} P_i^{0} Q_i^{1}}{\sum_{i=1}^{n} P_i^{0} Q_i^{0}} \times \frac{\sum_{i=1}^{n} P_i^{1} Q_i^{2}}{\sum_{i=1}^{n} P_i^{1} Q_i^{1}} \times \frac{\sum_{i=1}^{n} P_i^{2} Q_i^{3}}{\sum_{i=1}^{n} P_i^{2} Q_i^{2}} \times \ldots\ldots \times \frac{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y}}{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}}$$

6.20 The derivation of quarterly chain Laspeyres volume indexes is in concept no different to compiling annual chain volume indexes. However there is the complication of seasonality to contend with. In the ASNA, annual base years (i.e. annual weights) are used to derive quarterly volume indexes rather than having quarterly base periods. If quarterly base periods were to be used then this should only be done using seasonally adjusted data and not original data.

6.21 Consequently the Laspeyres-type[27] volume index from year *y-1* to quarter *c* in year *y* takes the form

$$L_Q^{(y-1)\to(c,y)} = \frac{\sum_{i=1}^{n} P_i^{y-1} 4q_i^{c,y}}{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}} = \sum_{i=1}^{n} \frac{4q_i^{c,y}}{Q_i^{y-1}} s_i^{y-1},$$

where $q_i^{c,y}$ is the volume of product $i$ in the $c^{th}$ quarter of year $y$ and $s$ is the share (weight) of the $i^{th}$ item. For more detail see Annex A to this chapter.

DERIVING ANNUALLY-LINKED QUARTERLY LASPEYRES-TYPE VOLUME INDEXES

6.22 There are several ways of linking annually weighted quarterly Laspeyres-type volume indexes. Annex A to this chapter describes the three methods outlined in 2008 SNA, including the one-quarter overlap method which is used in the ASNA.

6.23 After linking, the quarterly chain volume estimates are benchmarked to their annual counterparts. This benchmarking serves two purposes:

1. It overcomes the inconsistency arising from using quarterly link factors for the quarterly chain volume estimates and annual link factors for the annual chain volume estimates;

2. It ensures the quarterly chain volume estimates are consistent with the data from the annual S-U tables derived in current prices and in the average prices of the previous year.

6.24 The one-quarter overlap method involves calculating a link factor using overlap values for a single quarter. To link the four quarters of year *y-1* at year *y-2* average prices with the four quarters of year *y* at year *y-1* average prices, a one-quarter overlap can be created for either the fourth quarter of year *y-1* or the first quarter of year *y*. The link factor derived from an overlap for the fourth quarter of year *y-1*

[27] The term Laspeyres-type index is used to describe quarterly indexes with annual weights.

$$= \frac{\sum_{i=1}^{n} P_i^{y-1} q_i^{4,(y-1)}}{\sum_{i=1}^{n} P_i^{y-2} q_i^{4,(y-1)}}$$

6.25 Multiplying the quarterly values for year *y-1* at year *y-2* average prices with this link factor puts them on to a comparable valuation basis with the quarterly estimates for year *y* at year *y-1* prices.

## PRICE INDEXES

6.26 The ABS publishes two types of price index in the national accounts:

- chain Laspeyres price indexes; and
- implicit price deflators (IPD).

6.27 The quarterly chain Laspeyres price indexes are derived in the same way as the quarterly chain Laspeyres volume indexes, but they are only derived in original terms and are not seasonally adjusted

6.28 The IPDs are derived by dividing current price values by the corresponding chain volume measures (CVMs), but only using seasonally adjusted data. They are thus seasonally adjusted chain Paasche price indexes.

## INTRODUCTION OF NEW BASE YEARS AND RE-REFERENCING CHAIN VOLUME ESTIMATES

6.29 As described above, the ABS derives its annual and quarterly chain volume estimates using the Laspeyres formula with annual base years. With the exception of the latest quarters, quarterly chain volume estimates are derived by linking together estimates derived in the average prices of the previous year. However, the latest five to eight quarters are derived in the average prices of the latest base year, which is the year before the previous year. The reason for this exception is the delay in deriving the annual current price estimates of gross value added by industry, which are needed to form the base year weights for the volume estimates of GDP(P) and its components. Even though estimates of final expenditures could be derived in the average prices of the previous year for all years, the ABS has decided to apply the same approach and timing for all its volume estimates.

6.30 It is ABS practice to introduce a new base year with the release of the September quarter accounts. At the same time, the reference year is advanced one year to coincide with the latest base year, thereby ensuring additivity for the latest quarters. The process is best explained with some examples.

6.31 In the June quarter release in year y, the quarterly chain volume estimates are derived by linking:

- the eight quarters from September quarter year *y-2* to June quarter year *y* in the average prices of financial year *y-3/y-2*;
- the four quarters from September quarter year *y-3* to June quarter year *y-2* in the average prices of financial year *y-4/y-3*; and
- all earlier quarters in the average prices of the previous financial year.

6.32 Financial year *y-3/y-2* is the reference year.

6.33 In the following September quarter release in year y, the quarterly chain volume estimates are derived by linking:

- the five quarters from September quarter year *y-1* to September quarter year *y* in the average prices of financial year *y-2/y-1*;
- the four quarters from September quarter year *y-2* to June quarter year *y-1* in the average prices of financial year *y-3/y-2*; and
- all earlier quarters in the average prices of the previous financial year.

Financial year *y-2/y-1* is the reference year.

6.34 Re-referencing results in revisions to the levels of the chain volume measures, but it does not in itself result in revisions to growth rates, although growth rates can be revised for other reasons. One reason is that the introduction of a new reference year coincides with the introduction of a new base year for the latest four quarters. Another reason is the introduction of revised annual estimates, to which the quarterly estimates are benchmarked.

### CONTRIBUTIONS TO GROWTH

6.35 In the dissemination of quarterly national accounts, contributions to growth play a prominent role – a role that has become more important with the loss of additivity that has accompanied the introduction of chain volume estimates. While the chain volume estimates of the components of an aggregate do not generally add up to the chain volume estimate of the aggregate, it is possible to calculate the contributions of each component to the growth rate of the aggregate that are additive.

6.36 Deriving contributions to growth from additive data, such as constant price estimates, is straightforward. Unsurprisingly, deriving the contributions to growth of quarterly chain volume estimates is more complex and unlike constant price estimates there is no one formula that can be applied in all cases. Rather, the methods that can be used depend on how the chain volume estimates have been derived:

- the index formula used (e.g. Laspeyres or Fisher);
- annual or quarterly base years;
- method of linking in the case of annual base years;
- the period over which the contributions to growth are calculated (e.g. quarter-to-quarter or quarter on same quarter of previous year); and
- special features of a component (e.g. changes in inventories).

6.37 The method used in the ASNA exploits the additivity of chain Laspeyres volume indexes in the year following the reference year. This phenomenon arises because the chain volume estimates in this year are in effect values in the prices of the previous year.

6.38 The quarterly chain volume estimates of the components and the aggregates in year *y-1* and year *y* are re-referenced to their respective annual current price values in year *y-1* by multiplying them by their implicit price deflators for year *y-1*. This amounts to dividing each time series of quarterly chain volume estimates by the annual value of the chain volume estimates in year *y-1* and then multiplying the result by the current price value in year *y-1*. The resulting quarterly chain volume estimates are additive in year *y*, and so the contributions to growth for quarters within year *y* are exactly additive.

$$Contrib.(x_i, X)^{c,y} = \frac{P_{x_i}^{y-1}}{P_X^{y-1}} \times \frac{\left(x_{CVi}^{c,y} - x_{CVi}^{c-1,y}\right)}{X_{CV}^{c-1,y}}$$

Where

- $X_{CV}^{c,y}$ is the chain volume estimate of an aggregate, such as GDP, in the $c^{th}$ quarter of year *y* and $P_X^{c,y}$ is the corresponding implicit price deflator;
- $x_{CV_i}^{c,y}$ is the chain volume estimate of the $i^{th}$ component of the aggregate in the $c^{th}$ quarter of year *y* and $P_{x_i}^{c,y}$ is the corresponding implicit price deflator.

### Effects of benchmarking

6.39 As described earlier, the ABS benchmarks its quarterly chain volume estimates to their annual counterparts. Prior to benchmarking, quarterly estimates in the prices of the previous year are additive, but after benchmarking (and re-referencing) they are usually not quite additive. This phenomenon arises because each quarterly chain volume series is independently benchmarked to its annual counterpart and the adjustments made to the quarterly estimates of the components are unlikely to be exactly consistent with the adjustments made to the aggregate. The upshot is that the contributions to growth are unlikely to be perfectly additive after benchmarking. Nevertheless, they can be expected to be sufficiently close to being additive for practical purposes.

### Data that are not strictly positive

6.40 The above method cannot be applied to data that are not strictly positive because meaningful implicit price deflators cannot be derived for them, and so the contributions to growth of such variables are derived residually by taking advantage of the fact that quarter-to-quarter contributions to growth are additive (or nearly so). For example, the contribution to growth in GDP of changes in inventories is derived as the difference between the contribution of gross capital formation and the contribution of gross fixed capital formation.

## DERIVING ELEMENTAL VOLUME ESTIMATES

6.41 Chain volume estimates are derived by aggregating volume estimates of components at the elemental level, i.e. the lowest level at which volume estimates are derived. Despite their name, the elemental volume estimates are measured in dollars and are in fact usually a bundle of goods and services of a similar type. Most are derived as constant price estimates, but some are chain volume estimates derived indirectly. The following describes the two basic approaches taken to derive the elemental volume estimates, namely, quantity revaluation and price deflation.

### Quantity revaluation

6.42 The first approach uses quantity data (tonnes, litres, etc.) to derive constant price estimates. For an individual product, the estimate of quantity in each period is multiplied by the price per unit of volume (or average unit value) in some base year. This method, referred to as *quantity revaluation*, can only be applied to produce estimates of reasonable quality if the product is defined narrowly enough to ensure that it is homogeneous in content and free from quality change over time (since a change in quality is defined as a change in volumes rather than as a change in price).

### Price deflation

6.43 The second approach to obtaining volume estimates is referred to as *price deflation*. A measure of the price component of the current price value is obtained (usually in the form of a price index) and is divided into the current price value in order to re-value it in the prices of the previous year.

6.44 Price deflation is the most commonly used method, largely because most macroeconomic statistics are available only as dollar values, and the very detailed quantity data required for quantity revaluation are unavailable. However, there are also advantages in using price deflation in circumstances where it may be possible to employ either approach. Relative price movements are normally more highly correlated between products and between industries than are relative quantity movements. Therefore, an adequate indicator of price movement can generally be obtained with less data than are required to obtain an equally adequate indicator of quantity movement. There are two other main advantages in using price deflation as opposed to quantity revaluation:

- in compiling price indexes, specific attention can be given more readily to excluding changes that are attributable to quality change, hence ensuring that any quality changes that do occur are automatically reflected as volume changes; and
- if directly relevant price or quantity data are not available to re-value a current price value, then the proxy price movements of related products will usually be more accurate indicators than proxy quantity movements.

6.45 In compiling its price indexes, the ABS makes a good deal of effort to ensure that as far as practicable they reflect 'pure' price change. When a change in specification of a good or service occurs, the ABS does its best to isolate and exclude any change in price attributable to the change in specification. To the extent that this is achieved, the resulting volume estimates reflect improvements (or degradations) in products. For details of how the ABS deals with specification changes in compiling its price indexes refer to *The Australian Consumer Price Index: Concepts, Sources and Methods* (cat. no. 6461.0) and *Producer and Foreign Trade Price Indexes: Concepts, Sources and Methods* (cat. no. 6419.0).

6.46 In most cases, the deflator is a fixed-weighted (i.e. the weights used to combine the constituent price indexes are not changed frequently) combination of lower level price indexes. In those cases where both the price and quantity relativities of the constituents of a current price value to be deflated are changing quickly, it is important to construct chain price indexes that are re-weighted frequently. Hence in the case of computer equipment a chain Fisher price index is used. In those cases where price and quantity relativities are not changing rapidly, reweighting is undertaken less frequently, but usually no less than once every six years. In any case, the ABS tries to do the deflation at the most disaggregated level practicable.

6.47 Where current price figures are only available at quite an aggregate level, but more detailed prices are available for components, then it is preferable to attempt a disaggregation of the total and deflate the components with the separate price series, rather than deflating at the level of the total using a fixed-weighted deflator. A variation on this approach is to use a model to decompose the current price aggregate, deflate the components and then create a Paasche price index from the aggregate current price and volume data. This method is used to deflate quarterly current price estimates of gross fixed capital formation (GFCF) of equipment, which are only available at an aggregate level. A product-flow model is created by using information from the latest annual S-U tables to weight together current quarter manufacturing output and foreign trade data to produce estimates of GFCF of equipment by detailed category. These are deflated using appropriate price indexes and then aggregated and divided into the corresponding current price aggregate to produce a Paasche price index for GFCF of equipment.

6.48 As far as possible the price indexes used for deflation should be on the same valuation basis as the current price data, e.g. at basic prices for outputs and purchasers' prices for final and intermediate expenditures. If a price index with an inappropriate valuation has to be used, then the ABS's national accounts compilers must ensure that suitable adjustments are made if an event occurs that invalidates the assumption that the price index is a suitable proxy.

### QUARTERLY CHAIN VOLUME ESTIMATES OF GROSS VALUE ADDED

6.49 Annual estimates of gross value added by industry are derived in the prices of the previous year by subtracting volume estimates of intermediate consumption from volume estimates of output. This is commonly referred to as double deflation. For quarterly figures, however, in the absence of accurate data for both output and intermediate consumption, double deflation is not generally recommended unless it is applied in quarterly balanced S-U tables. The principal alternative is to extrapolate value added in the base year at a detailed level by indicator series which are deemed to represent the volume movement of value added, such as a volume indicator of output. This is the approach adopted by the ABS for most industries. The exceptions are agriculture and those industries dominated by non-market production.

6.50 Because of substantial variations in the weather from one year to the next the relationship between agricultural outputs and inputs is erratic, and there is little option but to use double deflation to derive quarterly volume estimates of gross value added for agriculture.

6.51 In the case of industries dominated by non-market production, such as public administration and defence, volume estimates of gross value added are assumed to grow at the same rate as an indicator of inputs.

### SEASONALLY ADJUSTED CHAIN-LINKED VOLUME ESTIMATES

6.52 The compilation of seasonally (and calendar) adjusted quarterly chain-linked volume measures is the result of a sequence of operations, including seasonal and calendar adjustment, partial balancing, chain-linking and benchmarking. It is somewhat more complicated than deriving chain-linked original estimates because some of these steps need to be undertaken on unlinked data (partial balancing) and some need to be undertaken on chain-linked data (benchmarking, and seasonal and calendar factor estimation). The objective is to achieve the following for the seasonally adjusted chain linked data:

- they should be of sufficiently high quality, with no residual seasonality and no over-adjustment (the seasonal component should not contain irregular influences);

- when expressed in the average prices of the previous year they should be additively consistent, preferably with no statistical discrepancies;
- they should be temporally consistent with the same annual chain volume benchmarks used for the original data[28].

6.53 The following paragraph describes the steps taken in deriving seasonally adjusted, partially balanced and benchmarked, chain-linked quarterly Australian national accounts data:

1. Seasonally analyse each chain-linked quarterly national account series at the lowest level of aggregation at which seasonal adjustment is undertaken to derive seasonal and calendar adjustment factors.
2. Derive seasonally adjusted estimates in the average prices of the previous year. If the multiplicative model is used then the factors can be applied directly to original data in the prices of the previous year. If any other model is used the seasonally adjusted chain-linked series needs to be unlinked.
3. Aggregate the data to derive seasonally adjusted estimates in the average prices of the previous year for all major aggregates.
4. Partially balance the accounts in a S-U framework.
5. Chain link the estimates.
6. Benchmark the chain-linked, seasonally adjusted volume estimates to the corresponding annual data.
7. Run all the benchmarked series through the seasonal adjustment diagnostics to check for residual seasonality or any other problems. If there are any, go back to step 1 and recalculate the seasonal factors using the balanced and benchmarked original data.

### THE COMPILATION OF CURRENT PRICE AND CHAIN VOLUME ESTIMATES OF GDP

6.54 There are three approaches to deriving estimates of GDP: the income approach (GDP(I)), the expenditure approach (GDP(E)) and the production approach (GDP(P)). It is possible to derive volume measures of GDP using the last two approaches, but it is not possible to derive a volume measure of GDP by summing volume estimates of its income components. The reason is that some of the income components of GDP either do not have price and quantity dimensions in the usual sense (e.g. gross operating surplus) or they do not have unique price and quantity dimensions (e.g. wages, for which the price and quantity characteristics differ according to whether they are viewed from the perspective of an employer or of an employee). However, it is possible to derive a volume measure of GDP(I) by dividing the current price estimate of GDP(I) by the implicit price deflator of GDP(E).

6.55 From 1995-96, annual volume estimates of expenditure and production are compiled in the prices of the previous year in a S-U framework. Volume estimates of the supply of products by each Australian industry and imports are confronted and balanced with volume estimates of products used by Australian industries, final domestic expenditures, changes in inventories and exports. The balance between supply and use for each product category ensures that the volume measure of GDP in the prices of the previous year is the same whether it is derived by summing final expenditures and changes in inventories plus exports less imports or by summing the gross value added of each industry and taxes less subsidies on products. In other words the expenditure and production volume estimates of GDP are identical. The estimates in the prices of the previous year are divided by comparable current price estimates for the previous year to derive year-to-year Laspeyres volume indexes. These are chained to form annual chain volume estimates.

6.56 From 1994-95, annual current price estimates of income, expenditure and production are compiled in a S-U framework in parallel with the volume estimates, so that the annual current price and volume estimates of GDP using the income, expenditure and production approaches are identical from 1994-95 for all but the latest year.

6.57 For current price and volume estimates prior to 1994-95, and for quarterly estimates for all years, the estimates using each approach are only partially balanced, and there are usually differences between the I, E

[28] Temporal consistency with annual data is not an intrinsic characteristic of seasonally adjusted data when the seasonal pattern is changing over time, which it commonly does. However, because the one-quarter overlap method is used to derive the quarterly chain volume estimates it is necessary.

and P estimates. Nevertheless, for these periods, a single estimate of GDP is compiled. In chain volume terms, GDP is derived by averaging the chain volume estimates obtained from each of the three independent approaches. The current price estimate of GDP is obtained by reflating the average chain volume estimate by the implicit price deflator derived from GDP(E).

## ANNEX A DERIVING CHAIN VOLUME INDEXES

6A.1 The following provides a detailed description of the various chain volume measures and the issues associated with using them.

### Different index formulae

6A.2 The general formula for a Laspeyres volume index from year *y-1* to year *y* is given by:

$$L_Q = \frac{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y}}{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}}, \qquad (1)$$

where $P_i^{\,y}$ and $Q_i^{\,y}$ are prices and quantities of the $i^{th}$ product in year *y* and there are *n* products. The denominator is the current price value of the aggregate in year *y-1* and the numerator is the value of the aggregate in year *y* at year *y-1* average prices.

6A.3 A Paasche volume index from year *y-1* to year *y* is defined as:

$$P_Q = \frac{\sum_{i=1}^{n} P_i^{y} Q_i^{y}}{\sum_{i=1}^{n} P_i^{y} Q_i^{y-1}}, \qquad (2)$$

6A.4 A Fisher index is derived as the geometric mean of a Laspeyres and Paasche index:

$$F_Q = \left(L_Q P_Q\right)^{1/2} \qquad (3)$$

6A.5 A Paasche price index from year *y-1* to year *y* is defined as:

$$P_P = \frac{\sum_{i=1}^{n} P_i^{y} Q_i^{y}}{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y}}, \qquad (4)$$

6A.6 When this Paasche price index is divided into the current price index from year *y-1* to year *y* a Laspeyres volume index is produced

$$\frac{\dfrac{\sum_{i=1}^{n} P_i^y Q_i^y}{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}}}{P_P} = \frac{\dfrac{\sum_{i=1}^{n} P_i^y Q_i^y}{\sum_{i=1}^{n} P_i^y Q_i^y}}{\dfrac{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}}{\sum_{i=1}^{n} P_i^{y-1} Q_i^y}} = \frac{\sum_{i=1}^{n} P_i^{y-1} Q_i^y}{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}} = L_Q \qquad (5)$$

6A.7 Evidently, Laspeyres volume indexes and Paasche price indexes complement each other, and vice versa.

Table 6A.1 Comparison of Laspeyres, Paasche and Fisher volume indexes

**Sales of beef and chicken**

| | | Year 1 | Year 2 | Year 3 | Year 4 |
|---|---|---|---|---|---|
| Quantity (kilos) | | | | | |
| | Beef | 20 | 18 | 16 | 17 |
| | Chicken | 10 | 12 | 14 | 17 |
| Price per kilo ($) | | | | | |
| | Beef | 1.00 | 1.10 | 1.20 | 1.30 |
| | Chicken | 2.00 | 2.00 | 2.10 | 2.15 |
| Value ($) | | | | | |
| | Beef | 20.00 | 19.80 | 19.20 | 22.10 |
| | Chicken | 20.00 | 24.00 | 29.40 | 36.55 |
| | Total | 40.00 | 43.80 | 48.60 | 58.65 |

**Laspeyres volume index: year 1 to year 2 using year 1 prices**

| | Values at year 1 prices ($) | | | |
|---|---|---|---|---|
| | Year 1 | Year 2 | Volume index | Growth rate |
| Beef | 20.00 | 18.00 | 0.900 | -10.0% |
| Chicken | 20.00 | 24.00 | 1.200 | 20.0% |
| Total | 40.00 | 42.00 | 1.050 | 5.0% |

**Laspeyres volume index: year 2 to year 3 using year 2 prices**

| | Values at year 2 prices ($) | | | |
|---|---|---|---|---|
| | Year 2 | Year 3 | Volume index | Growth rate |
| Beef | 19.80 | 17.60 | 0.889 | -11.1% |
| Chicken | 24.00 | 28.00 | 1.167 | 16.7% |
| Total | 43.80 | 45.60 | 1.041 | 4.1% |

**Laspeyres volume index: year 3 to year 4 using year 3 prices**

| | Values at year 3 prices ($) | | | |
|---|---|---|---|---|
| | Year 3 | Year 4 | Volume index | Growth rate |
| Beef | 19.20 | 20.40 | 1.063 | 6.3% |
| Chicken | 29.40 | 35.70 | 1.214 | 21.4% |
| Total | 48.60 | 56.10 | 1.154 | 15.4% |

**Paasche volume index: year 1 to year 2 using year 2 prices**

| | Values at year 2 prices ($) | | | |
|---|---|---|---|---|
| | Year 1 | Year 2 | Volume index | Growth rate |

| | | | | | |
|---|---|---|---|---|---|
| | Beef | 22.00 | 19.80 | 0.900 | -10.0% |
| | Chicken | 20.00 | 24.00 | 1.200 | 20.0% |
| | Total | 42.00 | 43.80 | 1.043 | 4.3% |

**Paasche volume index: year 2 to year 3 using year 3 prices**

| | Values at year 3 prices ($) | | | |
|---|---|---|---|---|
| | Year 2 | Year 3 | Volume index | Growth rate |
| Beef | 21.60 | 19.20 | 0.889 | -11.1% |
| Chicken | 25.20 | 29.40 | 1.167 | 16.7% |
| Total | 46.80 | 48.60 | 1.038 | 3.8% |

**Paasche volume index: year 3 to year 4 using year 4 prices**

| | Values at year 4 prices ($) | | | |
|---|---|---|---|---|
| | Year 3 | Year 4 | Volume index | Growth rate |
| Beef | 20.80 | 22.10 | 1.063 | 6.3% |
| Chicken | 30.10 | 36.55 | 1.214 | 21.4% |
| Total | 50.90 | 58.65 | 1.152 | 15.2% |

**Comparison of the volume indexes**

| | Year 1 to 2 | Year 2 to 3 | Year 3 to 4 |
|---|---|---|---|
| **Laspeyres** | 1.050 | 1.041 | 1.154 |
| **Paasche** | 1.043 | 1.038 | 1.152 |
| **Fisher** | 1.046 | 1.040 | 1.153 |

6A.8 The following table provides an example of deriving Laspeyres volume indexes by deflation.

Table 6A.2 Derivation of Laspeyres volume indexes by deflation

**Sales of beef and chicken**

**Paasche price index: year 1 to year 2 using year 2 quantities**

| | Values at year 2 quantities ($) | | | |
|---|---|---|---|---|
| | Year 1 | Year 2 | Price index | Growth rate |
| Beef | 18.00 | 19.80 | 1.100 | 10.0% |
| Chicken | 24.00 | 24.00 | 1.000 | 0.0% |
| Total | 42.00 | 43.80 | 1.043 | 4.3% |

**Paasche price index: year 2 to year 3 using year 3 quantities**

| | Values at year 3 quantities ($) | | | |
|---|---|---|---|---|
| | Year 2 | Year 3 | Price index | Growth rate |
| Beef | 17.60 | 19.20 | 1.091 | 9.1% |
| Chicken | 28.00 | 29.40 | 1.050 | 5.0% |
| Total | 45.60 | 48.60 | 1.066 | 6.6% |

**Paasche price index: year 3 to year 4 using year 4 quantities**

| | Values at year 4 quantities ($) | | | |
|---|---|---|---|---|
| | Year 3 | Year 4 | Price index | Growth rate |
| Beef | 20.40 | 22.10 | 1.083 | 8.3% |
| Chicken | 35.70 | 36.55 | 1.024 | 2.4% |
| Total | 56.10 | 58.65 | 1.045 | 4.5% |

**Laspeyres volume indexes derived by deflation**

| | Year 1 to 2 | Year 2 to 3 | Year 3 to 4 |
|---|---|---|---|
| Value index | 1.095 | 1.110 | 1.207 |
| Paasche price index | 1.043 | 1.066 | 1.045 |
| Laspeyres volume index | 1.050 | 1.041 | 1.154 |

## Chain volume indexes

6A.9 Annual chain Laspeyres and Paasche volume indexes can be formed by multiplying consecutive year-to-year indexes.

$$L_Q^y = \frac{\sum_{i=1}^{n} P_i^0 Q_i^1}{\sum_{i=1}^{n} P_i^0 Q_i^0} \times \frac{\sum_{i=1}^{n} P_i^1 Q_i^2}{\sum_{i=1}^{n} P_i^1 Q_i^1} \times \frac{\sum_{i=1}^{n} P_i^2 Q_i^3}{\sum_{i=1}^{n} P_i^2 Q_i^2} \times \ldots\ldots \times \frac{\sum_{i=1}^{n} P_i^{y-1} Q_i^y}{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}} \quad (6)$$

$$P_Q^y = \frac{\sum_{i=1}^{n} P_i^1 Q_i^1}{\sum_{i=1}^{n} P_i^1 Q_i^0} \times \frac{\sum_{i=1}^{n} P_i^2 Q_i^2}{\sum_{i=1}^{n} P_i^2 Q_i^1} \times \frac{\sum_{i=1}^{n} P_i^3 Q_i^3}{\sum_{i=1}^{n} P_i^3 Q_i^2} \times \ldots\ldots \times \frac{\sum_{i=1}^{n} P_i^y Q_i^y}{\sum_{i=1}^{n} P_i^y Q_i^{y-1}}, \quad (7)$$

6A.10 Chain Fisher indexes can be derived by taking their geometric mean.

$$F_Q^y = \left(L_Q^y P_Q^y\right)^{1/2} \quad (8)$$

6A.11 All of these indexes can be re-referenced by dividing them by the index value in the chosen reference year and multiplying by 100 to produce an indexed series, or by multiplying by the current price value in the reference year to obtain a series in monetary values.

The case for using chain indexes

6A.12 Frequent linking is beneficial when price and volume relativities change monotonically. For example, volume estimates of gross fixed capital formation are much better derived as chain indexes than as fixed-weighted indexes (i.e. constant price estimates) mainly because of the steady decline in the relative prices of computer equipment and the corresponding increase in their relative volumes. While chain Fisher indexes perform best in such circumstances, and are a much better indicator than fixed-weighted indexes, chain Laspeyres indexes capture much of the improvement from frequent linking.

6A.13 Conversely, frequent chaining is least beneficial when price and volume relativities are volatile. All chained series are subject to drift (see box below) when there is price and volume instability, but chain Fisher indexes usually drift less than either chain Laspeyres or chain Paasche indexes.

**Drift and long-term accuracy**

*Suppose the prices and quantities are $p_i^t$ and $q_i^t$ at time t and $p_i^{t+n}$ and $q_i^{t+n}$ n periods later at time t+n.*

*Further suppose that the price in year t+n ($p^{t+n}$) returns to the same level that is was in year t ($p^t$) after having diverged from $p^t$ during the intervening years ($t^2$ to $t^{n-1}$). Similarly, the quantity in year t+n ($q^{t=n}$) also returns to its original level ($q^t$) after having diverged between those years. Direct Laspeyres, Paasche and Fisher volume indexes from year t to year t+n would equal 1.*

*However, it is unlikely that the values of a chain volume index would be identical in these years because of the cumulative effects of changes in the prices and volumes during the intervening years. The extent of the difference (usually expressed as the quotient of the two values) is a measure of the "drift" in the chain volume index between the two time periods.*

*In reality it is very uncommon for prices and volumes to return to the values observed in an earlier period. Therefore, in practice, the drift and long –term accuracy of a chain or fixed-weighted index can be assessed over a period of time by comparing it with a direct Fisher index, i.e. a Fisher index calculated directly from the first to the last observation in a period.*

6A.14 Table A.3 below compares the chain Laspeyres, chain Paasche and chain Fisher indexes of meat sales. It shows that in this example:

- the chain Fisher index and the Fisher index calculated directly from the first year to the fourth year show almost the same growth rate over the four year period, i.e. the chain Fisher index shows very little drift;
- both the chain Laspeyres and chain Paasche indexes come much closer to the two Fisher indexes than their fixed-weighted counterparts.

6A.15 It is important to note that this is just an example. In the real world, the differences between the different indexes are usually much less.

6A.16 For aggregates such as gross value added of mining and agriculture, and maybe exports and imports, where volatility in price and volume relativities are common, the advantages of frequent linking may be doubtful, particularly using the Laspeyres (or Paasche) formula. For reasons of practicality and consistency, the same approach to volume aggregation has to be followed throughout the accounts. So when choosing which formula to use, it is necessary to make an overall assessment of drift, accuracy and practical matters.

6A.17 In considering the benefits of chain volume indexes vis-à-vis fixed-weighted indexes, the 2008 SNA (paragraph 15.44) concludes that

> *"...it is generally recommended that annual indexes be chained. The price and volume components of monthly and quarterly data are usually subject to much greater variation than their annual counterparts due to seasonality and short-term irregularities. Therefore, the advantages of chaining at these higher frequencies are less and chaining should definitely not be applied to seasonal data that are not adjusted for seasonal fluctuations."*

Table 6A.3 Illustration of chain volume indexes, direct indexes and drift

| Sales of beef and chicken | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | **Laspeyres** | | | **Paasche** | | | **Fisher** | |
| **Chain volume indexes** | | | | | | | | |
| $L^1_{CV}$ = | 100.0 | =100.0 | $P^1_{CV}$ = | 100.0 | =100.0 | $F^1_{CV}$ = | 100.0 | =100.0 |
| $L^2_{CV}$ = | 100.0 x 1.050 | =105.0 | $P^2_{CV}$ = | 100.0 x 1.043 | =104.3 | $F^2_{CV}$ = | $(105.0 \times 104.3)^{0.5}$ | =104.6 |
| $L^3_{CV}$ = | 105.0 x 1.041 | =109.3 | $P^3_{CV}$ = | 104.3 x 1.038 | =108.3 | $F^3_{CV}$ = | $(109.3 \times 108.3)^{0.5}$ | =108.8 |
| $L^4_{CV}$ = | 109.3 x 1.154 | =126.2 | $P^4_{CV}$ = | 108.3 x 1.152 | =124.8 | $F^4_{CV}$ = | $(126.2 \times 124.8)^{0.5}$ | =125.5 |
| **Direct volume indexes** | | | | | | | | |
| $L^4_{DV}$ = | $\frac{17 \times 1.00 + 17 \times 2.00}{40.00}$ | =127.5 | $P^4_{DV}$ = | $\frac{58.65}{20 \times 1.30 + 10 \times 2.15}$ | =123.5 | $F^4_{DV}$ = | $(127.5 \times 123.5)^{0.5}$ | =125.5 |

Deriving annual chain volume indexes in the national accounts

6A.18 It is recommended in the 2008 SNA that the annual national accounts should be balanced in both current prices and in volume terms using S-U tables. In most cases, the volume estimates are best derived in the average prices of the previous year rather than some distant base year:

- assumptions of fixed relationships in volume terms are usually more likely to hold in the previous year's average prices than in the prices of some distant base year;
- the growth rates of volumes and prices are less affected by compositional change.

6A.19 The compilation of annual S-U tables in current prices and in the average prices of the previous year lends itself to the compilation of annual Laspeyres indexes and to the formation of annual chain Laspeyres indexes.

6A.20 In order to compute annual Fisher indexes from data balanced data in a S-U table, it is conceptually desirable to derive both Laspeyres and Paasche indexes from data balanced in a S-U table. The former requires balancing the S-U tables of the current year (y) in current prices (y) and in the average prices of the previous year (y-1) and the latter requires balancing S-U tables in the previous year (y-1) in the average prices of that year (y-1) and in the average prices of the current year (y). Thus the compilation of annual chain Fisher indexes, at least in concept, is somewhat more demanding than compiling annual chain Laspeyres indexes.

Deriving quarterly chain indexes in the national accounts

6A.21 Computationally, the derivation of quarterly chain indexes from quarterly data with quarterly base periods is no different to compiling annual chain indexes from annual data with annual base periods. But, as recommended by the 2008 SNA, if quarterly volume indexes are to have quarterly base periods and be linked each quarter, then it should only be done using seasonally adjusted data. Furthermore, if the quarterly seasonally adjusted data are subject to substantial volatility in relative prices and relative volumes, then chain indexes should not be formed from indexes with quarterly base periods at all. Even if the quarterly volatility

is not so severe, quarterly base periods and quarterly linking are not recommended using the Laspeyres formula because of its greater susceptibility to drift than the Fisher formula.

6A.22 A way round this problem is to derive quarterly volume indexes from a year to quarters. In other words, use annual base years (i.e. annual weights) to derive quarterly volume indexes. Consider the Laspeyres annual volume index in formula 1. It can be expressed as a weighted average of elemental volume indexes:

$$L_Q = \frac{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y}}{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}} = \sum_{i=1}^{n} \left( \frac{Q_i^{y}}{Q_i^{y-1}} \right) s_i^{y-1}, \text{ where } s_i^{y-1} = \frac{P_i^{y-1} Q_i^{y-1}}{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}} \quad (9)$$

$s_i^{y-1}$ is the share, or weight, of the $i^{th}$ item in year *y-1*.

6A.23 Paasche volume indexes can also be expressed in terms of a weighted average of the elemental volume indexes, but as the harmonic, rather than arithmetic, mean.

6A.24 A Laspeyres-type[29] volume index from year *y-1* to quarter c in year *y* takes the form

$$L_Q^{(y-1)\to(c,y)} = \frac{\sum_{i=1}^{n} P_i^{y-1} 4q_i^{c,y}}{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}} = \sum_{i=1}^{n} \frac{4q_i^{c,y}}{Q_i^{y-1}} s_i^{y-1}, \quad (10)$$

where $q_i^{c,y}$ is the volume of product *i* in the $c^{th}$ quarter of year *y*. In this case the annual current price data in year *y-1* are used to weight together elemental volume indexes from year *y-1* to each of the quarters in year *y*. The "4" in formula 10 is to put the quarterly data onto a comparable basis with the annual data. Note that constant price (or fixed-weighted) volume indexes are traditionally formed in this way, but the weights are kept constant for many years.

6A.25 Paragraphs 15.53 -15.54 of the 2008 SNA describe how chain Fisher-type indexes of quarterly data with annual base periods can be derived:

> *15.53 Just as it is possible to derive annually chained Laspeyres-type quarterly indices, so it is possible to derive annually chained Fisher-type quarterly indices. For each pair of consecutive years Laspeyres-type and Paasche-type quarterly indices are constructed for the last two quarters of the first year, year y-1 and the first two quarters of the second year, year y. The Paasche-type quarterly indices are constructed as backward-looking Laspeyres-type quarterly indices and then inverted. This is done to ensure that the Fisher-type quarterly indices are derived symmetrically. In the forward-looking Laspeyres-type indices the annual value shares relate to the first of the two years, whereas in the backward-looking Laspeyres-type indices the annual value shares relate to the second of the two years.*
>
> *15.54 For each of the four quarters a Fisher-type index is derived as the geometric mean of the corresponding Laspeyres-type and Paasche-type indices. Consecutive spans of four quarters can then be linked using the one-quarter overlap technique. The resulting annually chained Fisher-type quarterly indices need to be benchmarked to annual chain Fisher indices to achieve consistency with the annual estimates.*

[29] The terms Laspeyres-type and Fisher-type indexes are used to describe quarterly indexes with annual weights.

### Choosing between chain Laspeyres and chain Fisher indexes

6A.26 There are several advantages in using the Laspeyres formula:

- its adoption is consistent with compiling additive S-U tables in both current prices and in the prices of the previous year;
- quarterly chain volume estimates of both seasonally adjusted and unadjusted data can be derived;
- it is unnecessary to seasonally adjust volume data at the most detailed level, if desired;
- it is simpler to construct chain Laspeyres indexes than Fisher indexes and the risk of error is correspondingly less.

6A.27 The advantages of using the Fisher formula are:

- it is more accurate than the Laspeyres formula;
- it is more robust and less susceptible to drift when price and volume relativities are volatile.

6A.28 In practice, it is generally found that there is little difference between chain Laspeyres and Fisher indexes for most aggregates. The major threat to the efficacy of the use of the Laspeyres formula in the national accounts has been computer equipment. The prices of computer equipment have been falling rapidly and the volumes of production and expenditure have been rising rapidly for many years. Consequently, the chain Laspeyres and chain Fisher indexes for aggregates for which computer equipment is a significant component are likely to show differences. Until now, these differences have been insufficient to cause concern and have not been judged to outweigh the advantages of using the Laspeyres formula. Of course, when little production of computers occurs in a country, such as is the case in Australia, the volume growth of GDP cannot be affected, and inaccuracies in the measurement of the volume growth of expenditures on computer equipment are offset by inaccuracies in the measurement of the volume growth of imports.

6A.29 There is one other reason why the ABS has chosen to derive chain volume estimates using the Laspeyres formula. A requirement of using quarterly base periods is the availability of quarterly current price data (see formula 9). While there are quarterly current price estimates of final expenditures in the ASNA, there are no quarterly current price estimates of gross value added by industry at the moment. Hence it is currently not possible to derive chain volume estimates with quarterly base periods for the production measure of GDP.

### Deriving annually-linked quarterly Laspeyres-type volume indexes

6A.30 While there are different ways of linking annual Laspeyres volume indexes, they all produce the same result. But this is not true when it comes to linking annual-to-quarter Laspeyres-type volume indexes for consecutive years. Paragraphs 15.46 -15.50 of the 2008 SNA discuss three methods for linking these Laspeyres-type volume indexes; they are:

- annual overlap;
- one-quarter overlap; and
- over the year.

6A.31 When a Laspeyres-type quarterly volume index from year *y-1* to quarter *c* in year *y* is multiplied by the current price value for year *y-1* divided by four, then a value for quarter *c* is obtained in the average prices of year *y-1*.

$$\sum_{i=1}^{n} \frac{4q_i^{c,y}}{Q_i^{y-1}} s_i^{y-1} \frac{1}{4} \sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1} = \sum_{i=1}^{n} \frac{4q_i^{c,y}}{Q_i^{y-1}} \frac{P_i^{y-1} Q_i^{y-1}}{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}} \frac{1}{4} \sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1} = \sum_{i=1}^{n} q_i^{c,y} P_i^{y-1} \qquad (11)$$

6A.32 Hence the task of linking quarterly Laspeyres-type volume indexes for two consecutive years, year *y-1* and year *y*, amounts to linking the quarterly values of year *y-1* in year *y-2* average prices with the values of year *y* in year *y-1* average prices.

Annual overlap method

6A.33 One way of putting the eight quarters described in the previous paragraph onto a comparable valuation basis is to calculate and apply a link factor from an annual overlap. Values for year *y-1* are derived in both *y-1* prices and *y-2* prices and then the former is divided by the latter. Thus giving an annual link factor for year *y-1* to year *y* is equal to

$$\frac{\sum_{i=1}^{n} P_i^{y-1} Q_i^{y-1}}{\sum_{i=1}^{n} P_i^{y-2} Q_i^{y-1}} \qquad (12)$$

6A.34 Multiplying the quarterly values for year *y-1* at year *y-2* average prices with this link factor puts them on to a comparable valuation basis with the quarterly estimates for year *y* at year *y-1* prices. Note that this link factor is identical to the one that can be used to link the annual value for year *y-1* at *y-2* average prices with the annual value for year *y* at year *y-1* average prices. Therefore, if the quarterly values for every year *m* at year *m-1* average prices sum to the corresponding annual value, then the chain-linked quarterly series will be temporally consistent with the corresponding chain-linked annual series.

One-quarter overlap method

6A.35 The one-quarter overlap method, as its name suggests, involves calculating a link factor using overlap values for a single quarter. To link the four quarters of year *y-1* at year *y-2* average prices with the four quarters of year *y* at year *y-1* average prices, a one-quarter overlap can be created for either the fourth quarter of year *y-1* or the first quarter of year *y*. The link factor derived from an overlap for the fourth quarter of year *y-1* is equal to

$$\frac{\sum_{i=1}^{n} P_i^{y-1} q_i^{4(y-1)}}{\sum_{i=1}^{n} P_i^{y-2} q_i^{4(y-1)}} \qquad (13)$$

6A.36 Multiplying the quarterly values for year *y-1* at year *y-2* average prices with this link factor puts them on to a comparable valuation basis with the quarterly estimates for year *y* at year *y-1* prices.

6A.37 A key property of the one-quarter overlap method is that it preserves the quarter-to-quarter growth rate between the fourth quarter of year *y-1* and the first quarter of year *y* – unlike the annual overlap method. The "damage" done to that growth rate by the annual overlap method is determined by the difference between the annual and quarter link factors. Conversely, this difference also means that the sum of the linked quarterly values in year *y-1* differ from the annual-linked data by the ratio of the two link factors. Temporal consistency can be achieved by benchmarking the quarterly chain volume estimates to their annual counterparts.

6A.38 The following table illustrates the methods used to deriving link factors.

Table 6A.4 Comparison of the methods to derive link factors

**Sales of beef and chicken**

**Annual overlap method**

| Year 2 to Year 3 | Year 3 to Year 4 |
|---|---|
| $\frac{\sum_{i=1}^{2} P_i^2 Q_i^2}{\sum_{i=1}^{2} P_i^1 Q_i^2}$ | $\frac{\sum_{i=1}^{2} P_i^3 Q_i^3}{\sum_{i=1}^{2} P_i^2 Q_i^3}$ |
| $\frac{(1.1x18)+(2x12)}{(1x18)+(2x12)} = 1.043$ | $\frac{(1.2x16)+(2.1x14)}{(1.1x16)+(2x14)} = 1.066$ |

**One-quarter overlap method**

| Quarter 4 in Year 2 | Quarter 4 in Year 3 |
|---|---|
| $\frac{\sum_{i=1}^{2} P_i^2 q_i^{4,2}}{\sum_{i=1}^{2} P_i^1 q_i^{4,2}}$ | $\frac{\sum_{i=1}^{2} P_i^3 q_i^{4,3}}{\sum_{i=1}^{2} P_i^2 q_i^{4,3}}$ |
| $\frac{(1.1x6)+(2.0x3)}{(1.0x6)+(2.0x3)} = 1.05$ | $\frac{(1.2x4)+(2.1x3)}{(1.1x4)+(2.0x3)} = 1.0673$ |

Over-the-year method

6A.39 The over-the-year method requires compiling a separate link factor for each type of quarter. Each of the quarterly values in year *y-1* at year *y-2* average prices is multiplied by its own link factor. The over-the-year quarterly link factor for year *y-1* at average year *y-2* prices to year *y* at average year *y-1* prices for quarter c is equal to

$$\frac{\sum_{i=1}^{n} P_i^{y-1} q_i^{c,(y-1)}}{\sum_{i=1}^{n} P_i^{y-2} q_i^{c,(y-1)}} \qquad (14)$$

6A.40 The over-the-year method does not distort quarter-on-same quarter of previous year growth rates, since the chain-links refer to the volumes of the same quarter in the respective previous year valued at average prices of that year. However, it does distort quarter-to-quarter growth rates. In addition, the linked quarterly data

are temporally inconsistent with the annual-linked data and so benchmarking is needed. Given these shortcomings, the over-the-year method is best avoided.

6A.41 The following tables provide examples of using the annual and one-quarter overlap methods.

Table 6A.5 Quarterly chain volume measures – annual overlap method: referenced to year 2

| Sales of beef and chicken | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | | **2** | | | | **3** | | | | **4** | | |
| **Quarter** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** |
| Beef (kilos) | 5 | 4 | 3 | 6 | 4 | 5 | 3 | 4 | 4 | 4 | 5 | 4 |
| Chicken (kilos) | 2 | 3 | 4 | 3 | 2 | 4 | 5 | 3 | 3 | 4 | 6 | 4 |
| Price of beef in previous year ($) | 1.00 | 1.00 | 1.00 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 | 1.20 | 1.20 | 1.20 | 1.20 |
| Price of chicken in previous year ($) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.10 | 2.10 | 2.10 | 2.10 |
| Value of beef at previous year's prices ($) | 5.00 | 4.00 | 3.00 | 6.00 | 4.40 | 5.50 | 3.30 | 4.40 | 4.80 | 4.80 | 6.00 | 4.80 |
| Value of chicken at previous year's prices ($) | 4.00 | 6.00 | 8.00 | 6.00 | 4.00 | 8.00 | 10.00 | 6.00 | 6.30 | 8.40 | 12.60 | 8.40 |
| Total sales of meat in previous year's prices ($) | 9.00 | 10.00 | 11.00 | 12.00 | 8.40 | 13.50 | 13.30 | 10.40 | 11.10 | 13.20 | 18.60 | 13.20 |
| Link factor year 2 to 3 | 1.0429 | 1.0429 | 1.0429 | 1.0429 | | | | | | | | |
| Linking year 2 to year 3 ($) | 9.39 | 10.43 | 11.47 | 12.51 | 8.40 | 13.50 | 13.30 | 10.40 | | | | |
| Link factor year 3 to 4 | 1.0658 | 1.0658 | 1.0658 | 1.0658 | 1.0658 | 1.0658 | 1.0658 | 1.0658 | | | | |
| Linking year 2 and 3 to year 4 ($) | 10.00 | 11.12 | 12.23 | 13.34 | 8.95 | 14.39 | 14.18 | 11.08 | 11.10 | 13.20 | 18.60 | 13.20 |
| Factor to reference to year 2 | 0.9383 | 0.9383 | 0.9383 | 0.9383 | 0.9383 | 0.9383 | 0.9383 | 0.9383 | 0.9383 | 0.9383 | 0.9383 | 0.9383 |
| Referenced to year 2 ($) | 9.39 | 10.43 | 11.47 | 12.51 | 8.40 | 13.50 | 13.30 | 10.40 | 10.41 | 12.39 | 17.45 | 12.39 |
| Annualised ($) | 43.80 | | | | 45.60 | | | | 52.64 | | | |
| Quarterly growth rate (%) | | 11.11 | 10.00 | 9.09 | -32.88 | 60.71 | -1.48 | -21.80 | 0.14 | 18.92 | 40.91 | -29.03 |

Table 6A.6 Quarterly chain volume measures – one-quarter overlap method: referenced to year 2

| Sales of beef and chicken | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Year** | **2** | | | | **3** | | | | **4** | | | |
| **Quarter** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** | **1** | **2** | **3** | **4** |
| Beef (kilos) | 5 | 4 | 3 | 6 | 4 | 5 | 3 | 4 | 4 | 4 | 5 | 4 |
| Chicken (kilos) | 2 | 3 | 4 | 3 | 2 | 4 | 5 | 3 | 3 | 4 | 6 | 4 |
| Price of beef in previous year ($) | 1.00 | 1.00 | 1.00 | 1.00 | 1.10 | 1.10 | 1.10 | 1.10 | 1.20 | 1.20 | 1.20 | 1.20 |
| Price of chicken in previous year ($) | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.00 | 2.10 | 2.10 | 2.10 | 2.10 |
| Value of beef at previous year's prices ($) | 5.00 | 4.00 | 3.00 | 6.00 | 4.40 | 5.50 | 3.30 | 4.40 | 4.80 | 4.80 | 6.00 | 4.80 |
| Value of chicken at previous year's prices ($) | 4.00 | 6.00 | 8.00 | 6.00 | 4.00 | 8.00 | 10.00 | 6.00 | 6.30 | 8.40 | 12.60 | 8.40 |
| Total sales of meat in previous year's prices ($) | 9.00 | 10.00 | 11.00 | 12.00 | 8.40 | 13.50 | 13.30 | 10.40 | 11.10 | 13.20 | 18.60 | 13.20 |
| Link factor year 2 to 3 | 1.05 | 1.05 | 1.05 | 1.05 | | | | | | | | |
| Linking year 2 to year 3 ($) | 9.45 | 10.50 | 11.55 | 12.60 | 8.40 | 13.50 | 13.30 | 10.40 | | | | |
| Link factor year 3 to 4 | 1.0673 | 1.0673 | 1.0673 | 1.0673 | 1.0673 | 1.0673 | 1.0673 | 1.0673 | | | | |
| Linking year 2 and 3 to year 4 ($) | 10.09 | 11.21 | 12.33 | 13.45 | 8.97 | 14.41 | 14.20 | 11.10 | 11.10 | 13.20 | 18.60 | 13.20 |
| Factor to reference to year 2 | 0.9306 | 0.9306 | 0.9306 | 0.9306 | 0.9306 | 0.9306 | 0.9306 | 0.9306 | 0.9306 | 0.9306 | 0.9306 | 0.9306 |
| Referenced to year 2 ($) | 9.39 | 10.43 | 11.47 | 12.51 | 8.34 | 13.41 | 13.21 | 10.33 | 10.33 | 12.28 | 17.31 | 12.28 |
| Annualised ($) | 43.80 | | | | 45.29 | | | | 52.20 | | | |
| Quarterly growth rate (%) | | 11.11 | 10.00 | 9.09 | -33.33 | 60.71 | -1.48 | -21.80 | 0.00 | 18.92 | 40.91 | -29.03 |

### Deriving chain volume indexes of time series that are not strictly positive

6A.42 Some quarterly national accounts series can take positive, negative or zero values, and so it is not possible to derive chain volume estimates for them. The best known example is changes in inventories, but any variable which is a net measure is susceptible. While it is not possible to derive true chain volume estimates for variables that can change sign or take zero values, it is possible to derive proxy chain volume estimates. The most commonly used approach[30] is to:

- identify two strictly positive series that when differenced yield the target series;
- derive chain volume estimates of these two series expressed in currency units;
- difference the two chain volume series.

6A.43 Exactly the same approach can be used to derive seasonally adjusted proxy chain volume estimates except that after step 2 the two series are seasonally adjusted before proceeding to step 3.

6A.44 In the case of changes in inventories, the obvious candidates for the two strictly positive series are the opening and closing inventory levels. The chain volume index of opening inventories is referenced to the opening value in the reference year expressed at the average prices of the reference year. Likewise, the chain volume index of closing inventories is referenced to the closing value of inventories expressed at the average prices of the reference year. This ensures that the value of the proxy chain volume measure of changes in inventories is equal to the current price value in the reference year.

6A.45 Seasonally adjusted current price estimates of changes in inventories are obtained by inflating the proxy chain volume estimates by a suitable price index centred on the middle of each quarter and with the same reference year as the volume estimates.

[30] See paragraph 15.62 of the 2008 SNA

# CHAPTER 7 ANNUAL BENCHMARKS AND QUARTERLY ESTIMATES

## ANNUAL BENCHMARKS – SUPPLY AND USE APPROACH

### Introduction

7.1 Input and output (I-O) tables provide a means of undertaking detailed analysis of the process of production and the use of goods and services (i.e. products), and of the income generated in that production. The ASNA includes symmetric I-O tables as well as closely related S-U tables. Both types of tables are often referred to as I-O tables.

7.2 The integration of 'input-output' in the overall system of national accounts is an important feature of the ASNA. Its role in the ASNA is primarily related to the goods and services accounts and to the shortened sequence of accounts for industries. Complementing the full sequence of accounts for institutional sectors, which cover all kinds of accounts in the ASNA, the S-U tables, and subsequently the symmetric I-O tables, serve to provide a more detailed basis for analysing industries and products through a breakdown of the production account, and the generation of income account and the goods and services account, leading to the symmetric I-O table. 'Symmetric' means that the same classifications or units (e.g. the same groups of products) are used in both rows and columns. When the number of rows of products and columns of industries in S-U tables happens to be equal, they are referred to as square (not symmetric) S-U tables. However, S-U tables are most often rectangular (having more products than industries).

7.3 The I-O tables, and in particular the S-U tables, serve two purposes: statistical and analytical. They provide a framework for checking the consistency of statistics on flows of goods and services obtained from quite different kinds of statistical sources - industrial surveys, household expenditure inquiries, investment surveys, foreign trade statistics, etc. The ASNA, and the I-O tables in particular, serve as a coordinating framework for economic statistics, both conceptually for ensuring the consistency of the definitions and classifications used and as an accounting framework for ensuring the numerical consistency of data drawn from different sources. The I-O framework is also appropriate for calculating much of the economic data contained in the national accounts and detecting weaknesses. This is particularly important for the decomposition of the values of flows of goods and services into prices and volumes for the calculation of an integrated set of price and volume measures. As an analytical tool, I-O data are conveniently integrated into macroeconomic models in order to analyse the link between final demand and industrial output levels. I-O analysis also serves a number of other analytical purposes or uses.

7.4 A fundamental role is played in the ASNA by S-U tables. They show, for the economy as a whole and for groups of products, the total resources in terms of domestic output and imports, and the uses of goods and services in terms of intermediate consumption, final consumption, gross capital formation and exports. They also provide information on the generation of income from production.

7.5 They provide an accounting framework within which the commodity flow method of compiling national accounts - in which the total supplies and uses of individual types of commodities have to be balanced with each other - can be systematically exploited, resulting in improvements in the overall accuracy of the national accounts.

7.6 Commencing with 1994-95, the annual GDP account has been compiled using the product flow method. In other words, the compilation of the GDP account is fully integrated with the compilation of the I-O tables.

7.7 Conceptually, the GDP account and the I-O tables are fully integrated and consistent. The GDP account provides three approaches to measuring GDP: summing the incomes generated by production; summing final expenditures on commodities sold in Australia plus exports less imports of goods and services; and summing the value added at each stage of production. I-O tables are essentially a further disaggregation of the same three approaches. Whereas intermediate consumption is netted out from the GDP account, I-O tables bring these inter-industry flows of commodities back into focus, thereby providing a more developed articulation of the process of economic production, and the structure and interrelationships of industries. An important feature of the I-O tables is that they are fully balanced matrices which allow for the confrontation of data and the resolution of differences at a detailed level.

7.8 The strategy adopted by the ABS in relation to the compilation of I-O tables involves a two stage process whereby a series of S-U tables, in both current prices and in the prices of the previous year, are compiled annually. These tables constitute benchmarks for the annual and quarterly GDP accounts. The analytic I-O

tables are compiled as the second stage of this process when the S-U tables for a particular year are deemed to be final.

7.9 This approach to compiling the GDP account allows for the annual and quarterly current price GDP accounts to be benchmarked to balanced S-U tables. This applies for all years from 1994-95 except the latest year and the latest two years with the release of the June quarter national accounts (cat. no. 5206.0). The S-U tables for each year are effectively compiled three times: first preliminary tables, second preliminary tables, and final tables. The GDP account is benchmarked at each of these three stages. The re-benchmarked GDP account is published first in the September quarter issues of the ASNA. This strategy means that the quarterly accounts will never be projected more than eight quarters from a balanced set of annual accounts. Apart from the most recent year and the June quarter national accounts in cat. no. 5206.0 (for which a balanced estimate is not available) there will be only one measure of annual GDP, and consequently no statistical discrepancies in annual terms.

7.10 Estimates for the latest financial year are obtained by aggregation of the quarterly estimates, which are obtained in turn by extrapolating from the latest annual benchmark estimates using the most appropriate indicators. In some cases these are basically the same sources as those used in constructing the annual S-U tables (e.g. private GFCF on new dwellings is mainly based on data for the value of work done from the Building Activity Survey). In other cases the indicators used are closely related to the aggregate being estimated (e.g. quarterly gross operating surplus of non-financial corporations is mainly based on data from the Quarterly Business Indicator Survey). In a few cases the indicators used provide only a general indication of movements in the aggregate being estimated.

7.11 As explained previously, the compilation of balanced S-U tables requires three iterations. The sequence of S-U and I-O tables is scheduled for completion according to the following timetable:

| | |
|---|---|
| 1st preliminary | end of yr t + 12 months |
| 2nd preliminary | end of yr t + 24 months |
| Final | end of yr t + 36 months |
| Input-output tables *(based on 2nd preliminary S-U tables)* | end of yr t + 38 months. |

7.12 The major implication of this strategy is that the measures of current price annual GDP and its components are consistent between the S-U tables, the I-O tables and the GDP account, at the time that the I-O tables are compiled. However, it should be noted that the ABS does not revise I-O tables once they have been finalised, whereas the S-U tables and the GDP account may be revised for all periods whenever an historical revision is undertaken. Also, income-based and expenditure-based GDP in current price annual terms are equal within the GDP account for all years from 1994-95 except for the latest year and the June quarter national accounts in cat. no. 5206.0.

7.13 The volume movements derived from these tables are used to benchmark the volume movements published in the annual and quarterly GDP accounts. Volume movements in respect of the gross value added for industries compiled in this way are considered to be markedly superior to those produced by previous estimation methods.

7.14 The preferred method for estimating the volume change in an industry's value added is through double deflation. This means that value added, in the prices of the previous year (or some other base period) is obtained by deflating outputs and intermediate inputs separately. The value added estimate for the industry is computed as the difference between these output and input measures.

7.15 However the double deflation method cannot be used for all industries. Which method is applied to remove price effects depends on the robustness of information available. The double deflation method demands a high level of reliability in the current price production accounts and in the price or quantity data used for deflation. In situations where data may not meet the required standards, this technique introduces the possibility of numerous and compounding measurement errors. Gross value added is the difference between two large aggregates so a small error in one can significantly affect gross value added.

7.16 Because of the problems associated in trying to estimate volumes using double deflation, it is common to estimate the volume movements of value added using only one component, either output or input. This is referred to as the single indicator method.

7.17 In ASNA the single indicator method is applied to estimate the quarterly volume measures for most industries and is based on output indicators. The sum of the four quarters' volume estimates are used to confront the annual volume estimates which are mostly derived using the double deflation method.

7.18 It is also necessary to consider the appropriate way to estimate volumes for non-market producer activity as output is valued on the basis of the inputs. 2008 SNA recommends three possible methods for compiling volume estimates or the output of non-market producers:

1. Derive a proxy output price index;
2. Output volume method; and
3. Input volume method.

7.19 The second approach is recommended for non-market producers providing individual services and has been implemented for the education and health industries in ASNA. The third approach is recommended for non-market producers providing collective services (such as defence). To date this approach has not been adopted in ASNA.

### Product flow method or product balance method

7.20 When S-U tables are first prepared, they are unlikely to balance and until they are brought into balance, GDP measures from the production, income and expenditure approaches will differ. Only S-U tables provide a sufficiently rigorous framework to eliminate discrepancies in the measured flows of goods and services throughout the economy to ensure the alternative measures of GDP converge to the same value. The technique that enables this convergence is referred to as the product flow method or product balance method.

7.21 The amount of a product available for use within the economy must have been supplied either by domestic production or by imports. The same amount of the product entering an economy in an accounting period must be used for intermediate consumption, final consumption, capital formation (including changes in inventories) or exports. These two statements can be combined to give a statement of a product balance:

***Output + imports = Intermediate consumption + final consumption + capital formation + exports***

7.22 Given the accounting and valuation rules that underpin the national accounts and because the uses of products are usually valued at purchasers' prices and production at basic prices, it is necessary to add trade and transport margins, and taxes on products less subsidies on products to the left-hand (or supply) side of the identity so both sides are expressed in purchasers' prices. Thus a fuller articulation of the product balance for any product recognises that the sum of output at basic prices plus imports plus trade and transport margins plus taxes on products less subsidies on products is equal to the sum of intermediate consumption, final consumption and capital formation, all expressed at purchasers' prices, plus exports.

7.23 Since the figures for output and intermediate consumption correspond to the entries for output and intermediate consumption in the production account, the identity of the sum of all product balances may be rearranged to become:

***Output - intermediate consumption + taxes on products – subsidies on products = Final consumption + capital formation + exports – imports***

7.24 The left-hand side of this identity is equivalent to GDP at market prices, also known as the "production approach" to GDP. The right-hand side is also equal to GDP at market prices and is known as GDP measured by the "expenditure approach".

7.25 Value added (i.e. output - intermediate consumption + taxes on products – subsidies on products) can be disaggregated to show all the components of the generation of income account which is commonly referred as GDP measured by the "income approach". That is,

***Output - intermediate consumption + taxes on products – subsidies on products = Compensation of employees + gross operating surplus + gross mixed income + taxes on production and imports - subsidies on production and imports***

7.26 The S-U current price balancing process is undertaken as a manual exercise thereby enabling objective decisions to be made to adjust the data such that the discrepancies are resolved and the identities above hold true. These decisions are based on a variety of data sources and supporting evidence such as industry annual reports, industry body commentary, industry events news articles, and state of industry profiles.

### Goods and services account

7.27 The goods and services account is one of the most basic, if not the most basic, identity in the SNA. It captures the idea that all output from within the production boundary, plus imports, must be accounted for in one of the other two basic activities of the SNA, consumption of goods and services or accumulation of goods and services. Without the goods and services account, a S-U table would not be fully articulated and exhaust all products available within the economy.

7.28 The whole sequence of accounts can be viewed as built around the goods and services account by adding transactions relating to the generation, distribution and redistribution of income and saving. When these transactions are aggregated across all sectors and the rest of the world, total resources are equal to total uses. If these were to be "consolidated" out of the sequence of accounts, only the goods and services account would be left.

7.29 Every row of the S-U tables is a reminder of the basic identity of the goods and services account.

## QUARTERLY ESTIMATION METHODS

### Direct sources

7.30 The preferred method of compiling quarterly national accounts estimates is to use a high quality data source which provides data for the aggregate being measured according to the conceptual basis required for the national accounts. In such cases both the quarterly and annual estimates may be compiled from the same source, the annual estimates being obtained simply as the sum of the quarterly estimates.

### Indirect sources

7.31 Annual national accounts estimates are generally considered to be superior to quarterly estimates. In the case of the income, expenditure and production components of GDP, the annual estimates are balanced in S-U tables, unlike their quarterly counterparts. Therefore, it is desirable to ensure the quarterly estimates are temporally consistent with their annual counterparts. This is achieved by using mathematical procedures to "benchmark" the quarterly estimates to the annual estimates.

7.32 Three commonly used statistical benchmarking procedures are:

1. Pro rata adjustment;
2. Denton difference method; and
3. Denton proportional method.

#### Pro rata adjustment

7.33 In many cases the quarterly data sources used to compile the national accounts are less reliable, less detailed and/or less appropriate than those used for compiling the annual national accounts benchmarks for particular aggregates. Consequently, indicator series are used to allocate (on a pro rata basis) annual estimates for such aggregates to the quarters of each financial year, and to extrapolate forward for the quarters of the latest incomplete year.

7.34 This benchmarking method simply consists of multiplying the quarterly preliminary estimates in a year by the ratio of the annual national accounts variable to the sum of the preliminary estimates of the four quarters.

7.35 While this method preserves the quarterly growth rates within the year it changes the growth rate between the last quarter of one year and the first quarter of the next. The extent of the change to this growth rate is determined by how much the annual benchmark-to-preliminary estimate ratio (i.e. the ratio of the annual benchmark to the sum of the preliminary estimates for the corresponding four quarters) has changed between the two years. For example, if the ratio were to change from 1.02 in year t to 1.00 in year t+1, then

the growth rate of the preliminary estimates from the fourth quarter of year t to the first quarter of year t+1 would be reduced by two percentage points after benchmarking.

7.36 A particular problem that arises when using the indicators (pro rata) method is that the September quarter estimates can be adversely affected by what is known as the 'step problem'. A significant step problem will arise if the relationship between the annualised indicator series and the annual benchmark estimates varies significantly between any two consecutive financial years. In effect, the difference in the annual relationship between the benchmark and the indicator series is largely reflected in just the September quarter.

7.37 This problem is reduced by using the 'benchmark' procedure. Given the obvious advantage of using the 'benchmark' procedure, the pro rata method is generally only used in a limited number of cases where the step problem is not significant.

### Denton difference method

7.38 The benchmarked estimates are obtained by allocating the discrepancy between the sum of four preliminary quarters and the corresponding annual national accounts estimate to the four quarters in each year by minimizing a quadratic loss function over the whole, or overlapping lengthy spans, of the time series. Different versions of the quadratic loss function (expressed as a weight matrix) may be chosen.

7.39 The loss function is commonly defined as the sum of squares of either the first or second order differences of each preliminary quarterly estimate and the benchmarked quarterly estimate. In the first difference case, the benchmarked values are those that minimize the following

$$\min \sum_{t=1}^{n} \left( (b_t - p_t) - (b_{t-1} - p_{t-1}) \right)^2$$ , subject to satisfying the annual constraints,

where there are n quarterly observations and $b_t$ is the benchmarked quarterly estimate at time t and $p_t$ is the preliminary quarterly estimate at time t.

### Denton proportional method

7.40 A combination of the pro rata adjustment and the Denton difference method consists of minimizing the sum of squares of the first differences of the quotient of the benchmarked quarterly estimate and the preliminary quarterly estimate, i.e.

$$\min \sum_{t=2}^{n} \left( \frac{b_t}{p_t} - \frac{b_{t-1}}{p_{t-1}} \right)^2$$ , subject to satisfying the annual constraints.

7.41 This method can only be performed when the values of b and p are strictly positive.

#### *Characteristics of the two Denton methods*

7.42 The Denton difference method minimises the differences of the absolute adjustments of two neighbouring quarters, whilst the Denton proportional method minimises the differences of proportional adjustments of two neighbouring quarters. Therefore, the Denton difference method results in a smooth additive distribution of the differences between the annualised indicator and the benchmark series and the Denton proportional method results in a smooth multiplicative distribution of these differences. As a result, the Denton difference method tends to produce a smoother series, but the Denton proportional method changes the quarterly growth rates of the of the preliminary estimates least.

7.43 A characteristic of the quarterly national accounts series is that their seasonality and irregularity are generally more multiplicative than additive in nature, and better seasonal adjustments are generally obtained using a multiplicative rather than an additive model.

7.44 The Denton difference method can be applied to data that change sign, whilst the proportional method should only be applied to data that are strictly positive.

7.45 The methods described above are applicable to flow data, but there are other versions suitable for stock data and averages. For further details refer to Chapter 6 the IMF's *Quarterly National Accounts Manual*.

7.46 The ASNA uses the Denton proportional method for all flow series that are strictly positive. The Denton difference method is used when this is not the case, such as changes in inventories.

## Trend interpolation

7.47 Where there are no quarterly direct data sources or indicator series available it is necessary to generate a quarterly time series by adopting the most appropriate allocation procedure. One possible method would be to divide the annual estimate by four, but this would result in steps each September quarter and no change in the other three quarters. The method used in the ASNA is to apply a linear interpolation method to calculate quarterly time series from annual series. The procedure involves forecasting annual estimates for two extra years, using a weighted average of the movements in year t-1 and year t. However, if information is available which provides a superior forecast for the annual estimates for those two years, such forecasts are used in preference to the standard projection produced by the interpolation procedure.

7.48 A mathematical representation of the trend interpolation procedure is given below. This method is particularly appropriate for series such as consumption of fixed capital, where only annual estimates are available and where it is reasonable to expect that movements in the quarterly series will be relatively smooth.

7.49 This type of interpolation procedure is designed to calculate quarterly series from annual series by linear trend interpolation; the annual series are projected backwards by one period and forwards by two periods using a weighted average of the rate of increase prior to calculation of the quarterly values (the forward projection gives quarterly estimates for the current year).

Table 7.1 Mathematical representation of the trend interpolation procedure

Let $Y_1, Y_2, \ldots, Y_n$ represent the annual series. Then the extrapolated annual series will be:

$$Y_0, Y_1, Y_2, \ldots, Y_n, Y_{n+1}, Y_{n+2}$$

where $Y_1, Y_2, Y_3$ are all positive

$$Y_0 = Y_1\left(0.4\,\frac{2+Y_2}{2+Y_3} + 0.6\,\frac{2+Y_1}{2+Y_2}\right)$$

otherwise if $Y_1, Y_2, Y_3$ are all negative, then

$$Y_0 = Y_1 - 0.6(Y_2 - Y_1) - 0.4(Y_3 - Y_2)$$

And if $Y_n, Y_{n-1}, Y_{n-2}$ are all positive

$$R = 0.4\,\frac{2+Y_{n-1}}{2+Y_{n-2}} + 0.6\,\frac{2+Y_n}{2+Y_{n-1}}$$

$$Y_{n+1} = RY_n$$

$$Y_{n+2} = RY_{n+1}$$

where $R$ is the weighted projection factor used in order to move forward two periods when the annual series are all positive.

Otherwise,

$$X = 0.4(Y_{n-1} - Y_{n-2}) + 0.6(Y_n - Y_{n-1})$$

$$Y_{n+1} = X + Y_n$$

$$Y_{n+2} = X + Y_{n+1}$$

where $X$ is the weighted projection factor used in order to move forward two periods when the annual series contain negative values.

The interpolation procedure which gives the required quarterly series is defined by the following.

For any year $t$, where $t=1$ to $n-1$ (same as above), the four quarterly observations are:

$$q_t,1 = \frac{1}{4}\left(\frac{1}{4}Y_{t-1} + \frac{7}{8}Y_t - \frac{1}{8}Y_{t+1}\right)$$

$$q_t,2 = \frac{1}{4}\left(\frac{9}{8}Y_t - \frac{1}{8}Y_{t+1}\right)$$

$$q_t,3 = \frac{1}{4}\left(-\frac{1}{8}Y_{t-1} + \frac{9}{8}Y_t\right)$$

$$q_t,4 = \frac{1}{4}\left(-\frac{1}{8}Y_{t-1} + \frac{7}{8}Y_t + \frac{1}{4}Y_{t+1}\right)$$

## Seasonal adjustment and trend estimates

7.50 Quarterly time series such as those in national accounts publications are affected by three influences – calendar (mostly seasonal), trend and irregular influences – and the original series can conceptually be split into activity due to each of these components. For example, the activity in a particular December quarter can be conceptually split into:

- systematic calendar and/or seasonal related activity, e.g. Christmas related activity, October long weekend activity, etc.,
- trend activity, i.e. the underlying level of the series, and
- irregular activity, e.g. impact of a short-term stimulus package, short-term non-systematic and unpredictable fluctuations.

7.51 When interpreting a quarterly series, it is helpful to assess combinations of the three components, as they each highlight different attributes of the data. In particular, the original, seasonally adjusted and trend series are seen as valuable tools for interpreting time series data. The original series contains all three components, and shows 'what actually happened' (according to our survey data). The seasonally adjusted series has the seasonal component removed, leaving the trend and irregular, and shows what happened once the systematic activity that happens the same way every year has been removed, revealing more information about the underlying direction of the series and/or the impact of irregular influences that may have been overshadowed by seasonal influences in the original series. Finally, the trend series contains only the trend component, and is a reflection of the underlying level or long-term behaviour of the series.

7.52 The seasonal adjustment process splits the original series into estimates of the three components. It first estimates and removes the seasonal and calendar related influences, creating the seasonally adjusted series. A further statistical process (Henderson smoothing) removes the irregular influence to reveal an estimate of the trend. The estimate of the irregular influences is then the difference between the seasonally adjusted and the trend. This section summarises the methods used by the ABS to decompose quarterly national accounts series into their three components and generate the published seasonally adjusted and trend series.

### The seasonal adjustment process

7.53 Seasonal effects usually reflect the influence of the seasons themselves, either directly or through production series related to them (such as costs for generating farm production), or social conventions (such as the incidence of holidays) or administrative practices (such as the timing of tax payments). Other types of calendar variation occur as a result of influences such as the number and composition of days in the calendar period (trading day), accounting or recording practices adopted by businesses, the effect of regular paydays on activity levels or the incidence of movable holidays (such as Easter).

7.54 Statistical techniques can be used to evaluate the effects of normal seasonal and other calendar influences operating on a series. If detectable seasonal or calendar variation is observed, then the estimated effects may be removed from the series to produce a seasonally adjusted series. Although calendar variation may be present in a series, factors applied in a particular period may vary significantly from year to year due to the variability in the number and composition of days in that particular period. This is especially evident in series affected by, say, the payment of salaries or pensions on a fortnightly basis. Seasonal or calendar variation can

also move gradually over time in reaction to changing influences, and this is allowed for in the estimation of the seasonal factors.

7.55 Not all statistical series are significantly affected by seasonal or calendar influences which are regular enough to be described as 'reliable', so seasonal or calendar influences cannot always be removed from them. In such cases the original series may be regarded as also being the seasonally adjusted series. Some examples in the quarterly national accounts are the rent component of farm costs and the series related to the consumption of fixed capital.

### The method of seasonal adjustment

7.56 The ABS' software for seasonal adjustment is the SEASABS (SEASonal analysis, ABS standards) package, a knowledge-based seasonal analysis and adjustment tool. The seasonal adjustment algorithm used by SEASABS is based on the X-11 Variant seasonal adjustment software from the U.S. Census Bureau.

7.57 The X-11 technique uses a filter based approach to decompose the series to be analysed into estimated trend, seasonal and irregular components. The irregular component reflects the influence of unusual or transitory effects, e.g. the effect of a major industrial dispute or of unseasonal weather conditions. It also reflects sampling and non-sampling errors which may be present in the original series, and other short term fluctuations in the series that are neither systematic nor predictable.

7.58 The X-11 program includes a statistical procedure for automatically identifying and modifying unusually large or small values included in the original series, for the purposes of improving the estimate of the seasonal component only. Occasionally, modification of extreme values is undertaken directly prior to seasonal adjustment, in order to better stabilise the estimation of the seasonal component, and minimise the extent to which both the estimated seasonal and trend components are affected by irregular influences.

7.59 Adjustments are also made prior to seasonal analysis to deal with abrupt discontinuities in the seasonal pattern or the trend where sufficient observations and/or supplementary information are available to estimate the magnitude of the effects. These 'break factors' have been employed retrospectively in the analysis of a number of national accounts series, and some series contain more than one such break. It is impossible in most cases to recognise and assess changes in seasonality or trend at the time they occur, and until enough subsequent data are available to indicate otherwise, they may initially remain undetected or be considered irregular effects.

7.60 Although based on the X-11 software, SEASABS also includes components of the U.S. Census Bureau X-12 ARIMA software package. For the national accounts, regression-ARIMA modelling techniques from X-12 ARIMA are used to compare actual original values to expected original values to detect possible extreme values and sudden discontinuities in the trend, and assist with the estimation of prior adjustment factors to account for them. Additional information (such as unit record data) may also be used in the estimation of appropriate prior adjustment factors.

7.61 The seasonal adjustment process alone cannot indicate whether an unexpected movement appearing in current end seasonally adjusted figures denotes a variation in trend, or an unusual (irregular) effect, or whether it is due to an abrupt change in seasonality. However, the addition of subsequent data points to the series end and/or supplementary information about the reasons underlying series behaviour can assist in the identification and treatment of seasonal or trend discontinuities as soon as possible after they occur.

7.62 After extreme values and sudden discontinuities in a series have been accounted for, calendar and seasonal effects, where measurable, are estimated by X-11 using mainly filtering techniques, and occasionally regression procedures. The estimated seasonal and calendar influences, together with certain (but not all) prior adjustment factors, form the combined adjustment factors by which the original series is seasonally adjusted. It should be noted that only the estimates of seasonal and/or other types of calendar variation are removed from the original series to form the seasonally adjusted series, which contains the trend and irregular components. Since the irregular influences remain, an unexpectedly large movement in the seasonally adjusted series does not necessarily indicate a change in the underlying trend of the series.

### Multiplicative, additive or pseudo-additive adjustments

7.63 The SEASABS program allows for the original series to be decomposed into trend, seasonal and irregular components by using a multiplicative, additive or pseudo-additive model. The choice of which of these models to use depends on whether it is more appropriate to consider the amplitudes of the trend, seasonal and irregular components to be proportional to or largely independent of each other. Specifically, the

multiplicative model treats all three components as dependent on each other, the additive model treats them independently, and the pseudo-additive model treats the seasonal and irregular components as independent of each other but dependent upon the level of the trend.

7.64 Although most series in the national accounts are adjusted multiplicatively there are some exceptions. Series which include both positive and negative values cannot be directly adjusted using a multiplicative model. If such series cannot be disaggregated into components having wholly positive (or negative) values, an additive or pseudo-additive model must be used. Several series relating to gross farm product (i.e. outputs and inputs) are affected by such extreme seasonal variations that the pseudo-additive model provides the best seasonally adjusted results. Other time series (especially inventories) are best adjusted using the additive model.

### Direct or indirect seasonal adjustments for aggregate series

7.65 It is possible to seasonally adjust an aggregate series either directly or by seasonally adjusting a number of its components and adding the results. The latter (aggregative) method has been employed for most of the major aggregates in the national accounts. Besides retaining, as far as possible, the essential accounting relationships, the aggregative approach is needed because many of the aggregates include components having different seasonal and trend characteristics, and sometimes require different methods of adjustment. Details of the methods of adjustment used for each of the quarterly national accounts aggregates are available on request.

### Concurrent adjustment

7.66 The national accounts use a concurrent adjustment methodology, under which the calendar and seasonal effects are re-estimated each quarter using all available data, including that for the most recent period. This allows for the most accurate estimate possible of the seasonal component of the series, as:

- using the data from the most recent periods allows better estimates of the calendar effects at the current end, especially when the calendar effects for a period move over time;
- it automatically takes into account revisions to the original data, resulting in appropriate revisions to the seasonally adjusted and trend; and
- the adjustment method can be more responsive to changes in the seasonal and trend components, and identify them soon after occurrence, (e.g. under concurrent adjustment, turning points in the trend series are usually identified within 3 periods of them occurring).

7.67 The improvements to the estimation of the seasonal component result in improved estimates of the seasonally adjusted and trend series, especially at the current end, and smaller revisions in subsequent periods. Note that this method results in reduced revisions compared to the previously utilised adjustment methodology, forward factor adjustment, under which a year's worth of seasonal factors was extrapolated at the time of the annual reanalysis, and then revised a year later.

7.68 The use of concurrent methodology minimises the risk of incorrect seasonal forward factors being used in the adjustment process and an inappropriate seasonally adjusted series being published.

### The annual seasonal reanalysis cycle and revisions

7.69 National Accounts time series' characteristics are reviewed annually. During the reanalysis, the method and quality of the seasonal adjustment process are scrutinised for each series, for the purpose of identifying any changes required to improve the adjustment, and subsequently the seasonally adjusted and trend estimates. Such improvements could include:

- changes to decomposition models, filters, etc.;
- insertion of new prior adjustments (e.g. corrections for unusually large or small values, or adjustments for abrupt changes in the seasonal pattern or trend level); and/or
- improvements to existing prior adjustments (e.g. updating corrections in response to new supplementary information).

7.70 Significant revisions can occur as a result of the annual reanalysis, with the more recent periods likely to be most affected. However, the impact of such revisions has generally been reduced since the introduction of concurrent seasonal adjustment.

### Interpreting seasonally adjusted series

7.71 The following points need to be taken into account when using seasonally adjusted statistics:

- seasonal adjustment is a means of removing the estimated effects of seasonal and other types of calendar variation from statistical series, so that the effects of other influences on the series may be more clearly recognised;
- seasonal adjustment does not remove the effect of irregular influences from the statistics, so an unexpected movement in a seasonally adjusted series should not necessarily be regarded as a change in trend; and
- seasonally adjusted statistics will be revised following revisions to the original data and as additional original data points are included each quarter.

7.72 For all these reasons, seasonally adjusted series should not be regarded as 'definitive' or necessarily indicative of underlying economic influences or trends. They must be treated with caution as being no more than useful indicators of movements with calendar and seasonal related influences removed, but with the effects of short-term irregular and unpredictable events remaining. They can be a useful aid to critical interpretation but they are not a substitute for it. The best indicator of underlying behaviour for quarter to quarter changes is the trend series.

### The trend estimates

7.73 In cases where the removal of only the seasonal element from an original series (resulting in the seasonally adjusted series) may not be sufficient to allow identification of changes in its trend, a statistical technique is used to damp the irregular element. This technique is known as smoothing, and the resulting smoothed series are known as trend series.

7.74 Smoothing, to derive trend estimates, is achieved by applying moving averages to seasonally adjusted series. A number of different types of moving averages may be used; for quarterly series a seven term Henderson moving average is applied. The use of Henderson moving averages leads to smoother data series relative to series that have been seasonally adjusted only. The Henderson moving average is symmetric, but asymmetric forms of the average are applied as the end of a time series is approached. The application of asymmetric weights is guided by an end weight parameter which is based on the calculation of a noise-to-signal ratio (i.e. the average movement in the irregular component divided by the average movement in the trend component, known as the I/C ratio). While the asymmetric weights enable trend estimates for recent periods to be produced, they result in revisions to the estimates when subsequent observations are available.

7.75 Revisions to the trend series may arise from:

- the availability of subsequent data;
- revisions to the underlying data;
- identification of and adjustment for extreme values, seasonal breaks and/or trend breaks;
- re-estimation of seasonal factors; and
- changes to the end weight parameter.

7.76 For more information about ABS procedures for deriving trend estimates and an analysis of the advantage of using them over alternative techniques for monitoring trends, see *Information Paper: A Guide to Interpreting Time Series - Monitoring Trends* (cat. no. 1349.0).

### Further reading

7.77 For further information on time series analysis in the ABS, please refer to:

- *Information Paper: An Introductory Course on Time Series Analysis – Electronic Delivery* (cat. no. 1346.0.55.001)
- *Time Series Analysis Frequently Asked Questions* (cat. no. 1346.0.55.002)

# CHAPTER 8 GROSS DOMESTIC PRODUCT

## INTRODUCTION

8.1 The central concept in a national accounting system is economic production. Production is the process whereby inputs of labour, materials (produced or natural), accumulated capital assets and knowledge are combined to provide outputs of goods and services. Such a definition of production includes:

- production of goods that are supplied to units other than their producers, including goods used as inputs to the production of other goods;
- production of goods that are retained for the producer's own use;
- provision of services of all kinds which add to the value of goods (such as transport and merchandising services);
- provision of services directly bought and sold in the market in their own right (such as the services of doctors, teachers and entertainers);
- provision of knowledge-capturing products (that is the provision, storage, communication and dissemination of information, advice and entertainment) which the consuming unit can access repeatedly; and
- illegal production, comprising production of illegal goods and services (i.e. for which distribution or possession is forbidden by law) or production of legal goods and services by unauthorised producers (e.g. unlicensed medical practitioners).

8.2 Production is not confined to goods and services that are clearly of monetary value because they are bought and sold. Some produced goods and services do not enter the market, but are made available free of charge by the producer (for example, many goods and services produced by governments and non-profit organisations) or are for the direct use of the producer, either as final consumption or as inputs to the producer's own production or capital formation. Such non-market production can be regarded as including, in addition to the goods and services produced as the result of current work, the services which durable assets (such as cars, television sets and public parks) yield to their owners/users, and domestic services produced by households for use within the producing household. Such services are outside the market since they flow to their owners/users without any current exchange of money equivalent to the value of the services.

## THE PRODUCTION BOUNDARY

8.3 In the central accounts of the national accounts system, a more restricted view of production is taken. The national accounts are primarily constructed to assist governments and others to make market-based macroeconomic policy decisions, including analysis of markets and factors affecting market performance, such as inflation and unemployment. In 2008 SNA (and the ASNA), the value of domestic services produced and consumed within households are excluded from production because such services are relatively isolated and independent from markets, and are difficult to value in an economically meaningful way. Examples include cleaning, decoration and maintenance of the dwelling, cleaning, servicing and repair of household durables or other goods, washing, preparing meals, and child and aged care. Although the production of such services is not part of the central framework of the national accounting system, the value of the services can be shown in satellite accounts to the main accounts.

8.4 With the exception of own-account household services, 2008 SNA recommends coverage of the production of all goods and services that legally enter the market, and also that part of production which does not enter the market, but for which a realistic value can be imputed using closely related or analogous market transactions. Because illegal goods and services, such as illicit drugs and illegal gambling, are purchased in the market, their production is included in the 2008 SNA production boundary. However, because of data limitations, illegal production is not covered in the ASNA, although the effects of some of these activities may be included by default; for example, if money obtained from such activities is laundered through legitimate institutions that are covered by the national accounts.

8.5 Paragraph 6.24 of 2008 SNA states that, to satisfy the definition of production in an economic sense:

> "*There must be an institutional unit that assumes responsibility for the process of production and owns any resulting goods or knowledge-capturing products or is entitled to be paid, or otherwise compensated, for the change-effecting or margin services provided.*"

8.6 Institutional units are the basic units for which flows and stocks are recorded in the national accounts. The 2008 SNA description excludes from economic production natural processes without human involvement or direction, such as the unmanaged growth of fish stocks in international waters, but economic production includes the activity of fish farming and fishing for profit. Activities which cannot be purchased from producers are also outside the production boundary, regardless of whether the service may be beneficial to overall economic production. Included in this category are basic human activities such as eating and sleeping.

8.7 Although consumer durable assets such as cars, washing machines, microwave ovens and dishwashers provide a stream of services to their users over many years, in 2008 SNA (and the ASNA) such services are conventionally treated as consumed as soon as the assets are bought by a household. Paragraph 6.38 of 2008 SNA states:

> "*The use of a durable good, such as a vehicle, by persons or households for their own personal benefit or satisfaction is intrinsically a consumption activity and should not be treated as if it were an extension, or continuation, of production.*"

8.8 The disadvantage of this treatment is that, in time of hardship, households may temporarily reduce their purchases of these goods to a low level without significantly reducing their consumption of the services these goods provide. At such times, the national accounts figure for consumption, being restricted to purchases, may give a misleading impression of the community's ongoing level of consumption. However, to account for the services of consumer durables would require treatment of the durables as capital goods providing a stream of services over a number of years. As with own-account household domestic services, such a concept would not be appropriate for most market-based analyses.

8.9 Units of the general government sector provide goods and services free of charge or at nominal prices. Such activity nevertheless meets the definition of production. Because such government-provided goods and services are not purchased by the users, the general government sector is regarded as consuming its own output. The non-market output is valued at its cost of production. Similar considerations apply to many non-profit institutions, which meet their production costs from donations provided by members and benefactors and are able to provide goods and services free or at prices that are not commercially determined. As with general government bodies, the non-market production of non-profit institutions is valued at cost.

8.10 In the ASNA, values are also imputed for production of some other goods and services that are not sold in the market place. Imputations are confined to a small number of cases where a reasonably satisfactory basis for the valuation of the implied transactions is available, and where their exclusion could result in significant distortions in the accounts. Imputations are made for the following:

- services provided by owner-occupied dwellings;
- food and other goods produced by households for their own final consumption ('backyard production');
- services provided by financial institutions over and above explicit charges made;
- services provided by owner-builders in the construction of dwellings and major alterations and additions to dwellings; and
- the non-observed economy.

## BASIC, PRODUCERS' AND PURCHASERS' PRICES

8.11 There is more than one set of prices that can be used to value outputs and inputs depending on how taxes and subsidies on products and transport charges are recorded. ASNA uses basic prices for the valuation of industry outputs, and purchasers' prices for valuation of intermediate inputs and of final demand. This is in line with the recommendations in 2008 SNA.

8.12 It is important to note the distinction between taxes (and subsidies) on products and other taxes (and subsidies) on production when discussing alternate price measures. Taxes on products are payable per unit of the product (i.e. a flat amount dependent on the physical quantity of the product or a percentage of the value at which the product is sold). Other taxes on production are imposed on the producer regardless of the production of any product (e.g. land taxes).

### Basic prices

8.13 The basic price is the amount receivable by the producer from the purchaser for a unit of a good or service, minus any tax payable (including deductible value added taxes) plus any subsidy receivable, as a consequence of production or sale of the unit. Subsidies artificially reduce the sale price, so they are included in the basic price to obtain a measure of the true value of the goods or services produced. Taxes on products, if included, would artificially increase the price and so are excluded. The basic price also excludes any transport charges invoiced separately by the producer as recommended by 2008 SNA. The basic price therefore measures the amount retained by the producer in respect of the good or service that is produced as output.

8.14 Analysts who use I-O tables however, have expressed a strong preference for the definition of basic prices in the 1968 version of the SNA, which excludes the transport component whether separately invoiced or not. This treatment has been implemented in the I-O tables. This results only in changes to estimates of output and intermediate use by industry for series at basic prices, with no impact on gross value added, GDP or series at purchasers' prices.

### Producers' prices

8.15 2008 SNA states output can also be measured using producers' prices, which are defined as the amount receivable by the producer from the purchaser for a unit of a good or service produced as output minus any non-deductible GST invoiced to the purchaser, excluding any transport charges separately invoiced by the producer. This measure of output is not included within the ASNA.

### Purchasers' prices

8.16 The purchaser's price is the amount paid by the purchaser in order to take delivery of goods or services. Purchasers' prices include any taxes payable (less any subsidies receivable) on production and imports, and any transport charges paid separately by the purchaser to take delivery of goods. Value added taxes such as the GST are included in purchasers' prices unless they are allowable as deductions from the purchaser's value-added tax liability. Purchasers' prices are also referred to as market prices.

8.17 In the derivation of industry value added, outputs are valued at basic prices and intermediate consumption is valued at purchasers' prices. By convention, the resulting estimates of industry value added are described as being 'at basic prices'.

## MEASURES OF GDP

8.18 The conceptual underpinning of GDP is that it measures gross value added for all resident institutional units for the whole economy. Gross value added is the difference between output and intermediate consumption for each institutional unit and thereby measures the value created by production. Value added represents the contribution of labour and capital to the production process. This measure of GDP is commonly referred to as GDP measured by the production approach (GDP(P)).

8.19 GDP can be derived from income and expenditure flows as well as from the direct measures of production (i.e. value added). GDP is the source of income for the factors of production (labour and capital). Total factor income is derived by summing factor incomes (i.e. compensation of employees, gross operating surplus, gross mixed income). Adding taxes less subsidies on production and imports to total factor income gives GDP at purchasers' prices. GDP can also be derived as the sum of all final expenditures on goods and services (i.e. final consumption expenditures and GFCF), changes in inventories of finished goods, work-in-progress and raw materials, and the value of exports of goods and services less the value of imports of goods and services. Imports are deducted because, although included in final expenditures, they are not part of domestic production. These measures of GDP are commonly referred to as GDP measured by the income approach (GDP(I)) and GDP measured by the expenditure approach (GDP(E)) respectively.

8.20 GDP is a measure of production and not a measure of economic welfare. The level of production is important because it largely determines how much a country can afford to consume, and it also affects the level of employment. The consumption of goods and services, both individually and collectively, is one of the most important factors influencing the welfare of a community, but it is only one of several factors. Moreover, aggregate measures such as consumption expenditure and income do not show which sectors of

the population are increasing (or decreasing) expenditure, nor the distribution of income within the economy, nor whether the income generated is the result of more or fewer hours worked. Total welfare also depends on non-economic events, such as epidemics, droughts, floods, the state of the environment, individual and community stress levels, levels of crime, and political factors such as freedom and security. As a measure of production, GDP is not intended to embrace non-economic events. The national accounts are primarily intended to provide data at different levels of aggregation to meet the needs of analysts and others interested in the behaviour of the economy and the factors responsible for major market occurrences such as inflation, employment and unemployment. While certain aggregates may indicate changes in some aspects of welfare, changes in GDP do not necessarily correspond to changes in the overall welfare of the community.

8.21 GDP less consumption of fixed capital is called *net domestic product.* Consumption of fixed capital is a cost of production, which is recorded in the income and capital accounts. It may be defined in general terms as the cost, in the accounting period, of the decline in the current value of the producer's stock of fixed assets as a result of physical deterioration, foreseen obsolescence or normal accidental damage. It excludes losses associated with damage caused by war or natural disasters. Such losses are classified as capital losses and are recorded under 'Other changes in the volume of assets' as part of accumulation.

8.22 To be consistent with other entries in the accounts, consumption of fixed capital must be valued at the prices prevailing during the current accounting period. Although the consumption of fixed capital is analogous to the measure of depreciation used by businesses, business depreciation measures are generally not suitable for national accounting purposes. This is because businesses generally account for depreciation according to the standards of historical cost accounting in which the original purchase cost of an asset is allocated over the estimated life span of the asset. In periods of rising prices, historical cost accounting will understate the real (current) cost of replacing the asset and will result in an overstatement of business income and saving. Therefore, in the ASNA, the book value of depreciation is not used and estimates are substituted that reflect changes in the market value of assets. Estimates of the consumption of fixed capital are derived in conjunction with estimates of capital services and net capital stock.

8.23 In most cases, when a distinction is drawn between "gross" and "net" recording, "gross" means without deducting consumption of fixed capital and "net" means after deducting consumption of fixed capital. In general, the gross figure is easier to estimate and therefore more reliable, however the net figure is usually the one that is conceptually more appropriate and relevant for analytical purposes.

8.24 The following three chapters outline the concept, sources and methods used to compile annual and quarterly GDP by the production, expenditure and income approaches in the ASNA.

# CHAPTER 9 GROSS DOMESTIC PRODUCT - PRODUCTION APPROACH (GDP(P))

## COMPONENTS OF GDP(P)

9.1 GDP is the national accounting measure of production occurring in a whole economy during an accounting period (e.g. a quarter or a year). GDP is based on the concept of *value added*, which is the unduplicated value of goods and services produced in any given period. *Gross value added at basic prices* is equal to the total value of outputs at basic prices less the total intermediate consumption at purchasers' prices. GDP at purchasers' prices is equal to the sum of the gross value added at basic prices of all resident producers plus taxes on products payable less subsidies on products receivable. This measure is commonly referred to as GDP(P). That is,

***GDP(P) = Gross value added + Taxes on products - Subsidies on products***

***= Output - Intermediate consumption + Taxes on products - Subsidies on products***

9.2 The following describes the components of GDP(P) and how they are valued in concept.

### Output

9.3 Output consists of the value of goods and services produced within a type of activity unit (TAU). Output includes production that is completed in the accounting period as well as production in the accounting period that remains incomplete at the end of that accounting period. Goods and services produced as outputs may be:

- sold at 'economically significant' prices (i.e. prices which have a significant influence on both the amounts producers are willing to supply and the amounts purchasers wish to buy);
- bartered in exchange for other goods, services or assets that are provided to employees as compensation in kind, or used for other payments in kind;
- held as unsold 'finished' goods in the producers' inventories for subsequent sale, or held as work-in-progress in producers' inventories;
- supplied to another TAU belonging to the same enterprise as intermediate inputs into the latter's production;
- retained by the producers for own final consumption or gross fixed capital formation; and
- supplied free, or sold at prices that are not economically significant, to other institutional units (including households), as often occurs in the case of output of general government units and non-profit institutions.

9.4 The output of a TAU is defined as the value of total sales or other uses of goods (including capital work done on own account) and services produced as outputs plus the value of changes in the inventories of goods produced as outputs. Three categories of output are recognised for national accounting purposes: market output, output produced for own final use and non-market output. The distinction is necessary in order to obtain an accurate valuation of output for each. The determining factor for market and non-market output is whether or not the unit sets economically significant prices.

### Market output

9.5 Market output is output that is sold at economically significant prices or otherwise disposed of on the market, or output that is intended for sale or disposal on the market. Market output includes the value of goods or services bartered, supplied by one establishment to another in the same institutional unit for use in intermediate consumption, used for payments in kind, or margins on the supply of goods and services (including transport and financial services). Market output also includes the value of changes in inventories of finished goods and work-in-progress intended for disposal on the market.

9.6 Sales of goods are to be recorded when the ownership of the goods passes from the producer to the purchaser or when the services are provided to the purchaser. The valuation is at basic prices.

9.7 The valuation of changes in inventories poses special problems in a national accounting context. Changes in the valuation of inventories held at particular points in time can include the effects of price changes, as well as additions to and subtractions from inventories. As such holding gains or losses are not the result of production, they are excluded from the value of output in the national accounts. Accordingly, values of inventories used in measuring changes in inventories need to be adjusted to exclude them. In the ASNA, this adjustment is known as the inventory valuation adjustment (IVA).

### Output for own final use

9.8 Output for own final use includes output for own final consumption and output for own gross fixed capital formation.

- Output for own final consumption
  - Consists of goods and services that are produced for final use by the owners of the enterprises in which they are produced. Corporations have no final consumption (only intermediate consumption used in producing their outputs), and output for own final consumption is produced only by unincorporated enterprises. Two examples of such output are agricultural goods produced and consumed by members of the same household, and rent of owner-occupied dwellings.
- Output used for own gross fixed capital formation
  - Goods or services used for own gross fixed capital formation can be produced by any kind of unit, whether incorporated or unincorporated. Examples are machinery or equipment produced by an establishment for use in the same establishment and construction, extension or alteration of an establishment's building by the enterprise owning the establishment. In the ASNA, imputations are made of the value added by owner-builders in the construction, alteration or extension of their dwellings and for significant own-account construction carried out by private and public enterprises. An imputation is also made for computer software and research and development made on own account.

9.9 Output for own final use should be valued at the basic price at which the goods or services could be sold on the market, i.e. the price that would prevail between a willing buyer and willing seller at the time and place that the goods and services are produced. In the case of agricultural produce, the nearest equivalent price is likely to be the "farm-gate" price, i.e. the price the farmer could receive by selling the produce to a purchaser who comes to the farm to collect the produce.

9.10 When reliable market prices cannot be obtained, the value of output for own final use is the sum of costs of production. That is, the sum of intermediate consumption, compensation of employees, consumption of fixed capital, a net return to fixed capital and other taxes (less subsidies) on production. Where the own-account production is undertaken by a non-market producer, net return to fixed capital is not included.

### Non-market output

9.11 Non-market output consists of goods and services produced by NPISHs or general government units and supplied free, or at prices that are not economically significant, to other institutional units or to the community as a whole. For general government output, economically significant prices may not be charged to users either because the consumption of the goods or services cannot be monitored or controlled, as is the case with public administration and defence, or because governments make policy decisions not to charge the full cost, as with education and health services. Likewise, NPISHs often do not fully charge for their services because such institutions are formed to provide services to members or the needy.

9.12 The non-market output of general government units and NPISHs is valued at the costs of producing the outputs, comprising compensation of employees, the cost of purchased goods and services used in production (intermediate consumption), other taxes (less subsidies) on production and consumption of fixed capital. These units therefore do not generate a net operating surplus from their non-market production.

## Output of particular industries

9.13 The general rules governing the recording and valuation of output require elaboration regarding their application to the output of certain industries, mostly service industries such as transport and storage, wholesale trade and retail trade, and finance and insurance industries. Also included is a description of how to value the activities of research and development and the production of originals and copies.

### Transport and storage

9.14 The output of transport services is measured by the amounts receivable for transporting goods or persons. A good in one location is considered to be a different quality from the same good in another location, so the transporting from one location to another is a process of production. This activity is referred to as a transport margin.

9.15 The activity of storage is important in the production process whereby goods are "re-transported" from one point in time to another (as opposed to locations in the instance of transport services). For example, the inventories of goods have to be physically stored until they are sold and they may have to be stored in a properly controlled environment. The increase in price of a product due to the fact that is has been in storage and storage costs have been incurred is a production process. However, it is important that the increase in price due to storage is clearly distinguished from holding gains and losses, which are excluded from production.

9.16 There can be an increase in the value of a product other than a simple price rise as a result of being held in storage, that is, there can be an increase in value which is construed as a further stage in production. For example:

- the production process is sufficiently long that discounting factors should be applied to work put in place significantly long before delivery;
- the quality of the good may improve with the passage of time (such as wine); and
- there may be seasonal factors affecting the supply or the demand for the good that lead to regular, predictable variations in its price over the year, even though its physical qualities may not have changed.

9.17 Therefore, in principle, the values of additions to inventories include not only the values of the goods at the time they are stored but also the value of the additional output produced while the goods are held in store.

### Wholesale and retail trade

9.18 The major output of the wholesale and retail trade industries is the value of the service provided in selling goods (i.e. goods purchased and resold are not treated as part of intermediate consumption). The value of the service is equal to the trade margins realised on the goods sold. The measurement of this service at basic prices is analogous to that for goods producing industries: output at basic prices is the value of the trade margins, including the value of any subsidies received by the wholesaler or retailer, and excluding taxes on production of the service.

9.19 A trade margin is the difference between the actual or imputed price realised on a good purchased for resale and the price that would have to be paid by the distributor to replace the good at the time it is sold or otherwise disposed of. Margins can be negative if prices have to be marked down or the goods are never sold because they go to waste or are stolen.

9.20 It is important to note:

- goods sold are valued at the price they are actually sold;
- goods provided to employees as remuneration in kind are valued at the current purchasers' prices payable by the traders to replace them, therefore zero margin;
- additions to inventories of goods for resale are valued at the prices prevailing at the time of entry into inventories; and
- goods on withdrawal from inventories are valued at the cost to the wholesaler or retailer at the time of the withdrawal of acquiring similar replacement goods for later sale, unless the goods were acquired with the intention of making a real holding gain over the storage period, in which case the value of the holding gain is excluded.

Financial intermediaries (except insurance and pension funds)

9.21 Banks and other financial intermediaries incur liabilities on financial markets by borrowing funds (for example, in the form of deposits) which they lend, on different terms and conditions, to other institutional units, such as households, governments and corporations. Such institutions intermediate between lenders and borrowers by channelling funds from one to the other, incurring risk in the process.

9.22 Although financial intermediaries make explicit charges for a number of financial services, the charges do not cover the cost of all services provided. If receipts from the charges were the only measure of output, financial intermediaries would invariably appear to be running at a loss. However, financial intermediaries are able to provide services for which they do not charge explicitly, through charging higher rates of interest to borrowers than they pay to lenders. The resulting 'interest margin' is used to defray expenses. The interest-rate differential therefore includes an implicit charge to customers for services provided and plays a part in determining the level of interest rates observed in practice.

9.23 In the ASNA, interest is treated as property income and is not recorded as either output or intermediate input. However, in effect, interest receivable by financial intermediaries excludes payments by borrowers for the services provided by the financial institutions, and interest payable by financial intermediaries is lower than it would otherwise be to cover the costs of financial services provided to depositors.

9.24 Accordingly, interest flows are adjusted to take account of the service charges that form part of the output of financial intermediaries. In effect, the interest paid by borrowers can be regarded as comprising two components, a service charge and a 'pure' interest flow. Likewise, the interest paid to depositors can be viewed as a 'pure' interest flow from which a service charge has been deducted. The 2008 SNA refers to the pure interest as "SNA interest". As these service charges cannot be measured directly, the imputed charges are accordingly referred to as financial intermediation services indirectly measured (FISIM).

9.25 The method for calculating FISIM has been refined in 2008 SNA. This refinement is consistent with the existing ASNA treatment. FISIM payable by both depositors and borrowers will be calculated by using the concept of a 'reference' rate of interest. The reference rate should contain no service element and reflect the risk and maturity structure of deposits and loans, and could be determined as being equal to a particular market rate of interest. The ASNA uses a practical approach to estimating the reference rate of interest as the mid-point between the average interest rate on loans and the average interest rate on deposits. The long-term bond rate is used as the reference rate for institutions that are not deposit taking institutions. For domestic transactions, the reference rates applied are in the domestic currency, whereas for exports and imports of FISIM different reference rates are applied for loans and deposits in other currencies.

9.26 In the ASNA, FISIM is an output of the following financial intermediaries: banks, other depository corporations, central borrowing authorities and securitisers. For banks and other depository corporations it is the sum of the imputed service charges for both borrowers and depositors while, for central borrowing authorities and securitisers, it is the sum of the imputed service charge for borrowers.

9.27 The FISIM calculation is based on stock levels of loans and deposits, i.e.:

***[(Loan rate - reference rate)*Stock of loans] + [(reference rate - deposit rate)*Stock of deposits].***

9.28 As FISIM forms part of the output of financial intermediaries, it must also be recorded as part of consumption by the intermediaries' customers. FISIM is therefore shown as consumption by individual industries, government units and households, for both depositors and borrowers. Exports and imports of FISIM are also estimated.

9.29 Exports and imports of FISIM are calculated on reported income flows rather than reported asset and liability levels to ensure that calculated FISIM is consistent with reported income flows. The methodology for calculating FISIM by income flows is:

***[(Loan rate - reference rate) * interest flow on loans/loan rate] + [(reference rate - deposit rate) * interest flow on deposits/deposit rate].***

9.30 Exports of FISIM are generated through two transactions:

- interest income earned by resident financial intermediaries (providing services) on loans to non-resident non-financial entities;
- interest income payable by resident financial intermediaries (specifically depository corporations) on deposits (providing services) to non-resident non-depository corporations. The non-resident is paying for the service component provided by the resident, therefore it is recorded as an export of a service.

9.31 Imports of FISIM are generated through two transactions:

- interest income receivable by resident non-depository corporations on deposits held with non-resident financial intermediaries (specifically depository corporations) providing the service. The resident is paying for the service component provided by the non-resident, therefore it is recorded as an import of a service.; and
- interest payable by resident non-financial entities on loans from non-resident financial intermediaries (providing services).

9.32 A basket of international interest rates which are common to each major currency are monitored quarterly for deposits and loans. A mid-point between the average interest rate on loans and the average interest rates on deposits is used as the reference rate for each currency. FISIM is calculated for each currency and then aggregated to give a total figure for exports and imports of FISIM.

Insurance and pension funds

9.33 Insurance is a form of financial intermediation in which funds are paid by policy-holders and invested in financial or other assets, which represent technical reserves to meet future claims arising from the events specified in insurance policies. Typically, insurance enterprises do not make a separate charge for the service of arranging the financial protection or security which insurance is intended to provide. This is known as the insurance service charge (ISC).The value of the ISC, which forms part of the output of insurance and pension funds, has to be estimated indirectly from the total receivables and payables of insurance enterprises, including the income accruing from the investment of technical reserves.

9.34 The value of output of the services is produced by

- non-life insurance corporations – estimated as premiums earned and investment income on the technical reserves less expected claims;
- life insurance corporations – the sum of administrative costs incurred (including investment and labour costs) plus a profit margin; and
- pension funds – the sum of administrative costs incurred (including investment and labour costs).

Research and development

9.35 Research and development (R&D) is creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and to enable this stock of knowledge to be used to devise new applications. A major change in 2008 SNA is the recognition of expenditure on R&D as capital formation, whereas 1993 SNA treated it as intermediate consumption. The 2008 SNA treatment has been implemented in ASNA.

9.36 In principle, R&D output is valued at market prices if purchased (or outsourced) or as the sum of total production costs plus an appropriate mark-up representing the costs of fixed assets used in production if undertaken on own account. Survey data indicate that over 90% of R&D activity in Australia is undertaken on own account and representative market price data for R&D products are not available. Therefore R&D output is valued by the total production costs incurred.

9.37 Own account R&D is derived from the Survey of Research and Experimental Development and published in *Research and Experimental Development, Businesses, Australia (*cat. no. 8104.0). This dataset collects expenditure on the production of research and experimental development classified by both sector and type of research undertaken.

9.38 Survey aggregates are adjusted during S-U balancing to ensure alignment with other datasets used in the compilation of the ASNA.

9.39 With the exception of Ownership of dwellings, all industry divisions produce own account research and development.

9.40 Volume movements are obtained by deflating by the Labor Price Index (LPI). The resulting estimates are used to construct chain volume measures.

The production of originals and copies

9.41 The production of books, recordings, films, software, tapes, disks, etc. is a two-stage process where the first is the production of the original and the second is the production and use of the copies. 2008 SNA (and 1993

SNA) recommended the capitalisation of the production of entertainment, literary and artistic originals as well as computer software. Prior to this it was treated as intermediate consumption. The ASNA complies with the 2008 SNA treatment.

9.42 2008 SNA clarified that 'licences to use' should be treated as capital formation if they are to be used for more than one year, regardless of payment arrangements. The ABS does not have information on the duration of 'licences to use' and assumes that most software is purchased with the intention to be used beyond one year and so should be treated as capital formation.

9.43 If the original is sold when it has been produced, the value of the output of the original producer is given by the price paid. If it is not sold, its value could be estimated on the basis of its production costs with a mark-up. However, the size of any mark-up must depend on the discounted value of the future receipts expected from using it in production, so that it is effectively this discounted value, however uncertain, that determines its output value.

9.44 An estimation for computer software (consisting of packaged software, customised software and own account software) is included in the value of output even though there are some practical difficulties because software and hardware are often purchased as a package so businesses cannot always separately identify the software component. It is valued at market prices if purchased, while software developed in-house is valued at its estimated basic price or at its cost of production if it is not possible to estimate the basic price.

9.45 Estimates from the 2002/03 Information and Communication Technology (ICT) Satellite Account were incorporated into the ASNA for financial year 2002/03. Estimates for subsequent financial years are derived as follows:

- customised software and own account software are derived from linear trend interpolation; and
- packaged software is derived from the level of imports of computer software as an indicator.

9.46 Estimates for own account software are added to output where a proportion of other own account capital formation is considered computer software and allocated to industry and sector.

9.47 Current price estimates are deflated using mainly relevant producer price.

### Adjustments made to output

#### *Understatement of income*

9.48 Most ANZSIC divisions' estimates of Australian production at basic prices have an adjustment for the estimated level of understatement of income. The calculated value for each subdivision's understatement of income is added to the division's total output estimate to form the final Australian production at basic prices.

9.49 The percentage adjustment for each ANZSIC subdivision's estimated understatement of income is different. The estimated understatement of income is based on industry analysis conducted by the Australian Taxation Office from their audits of business income and business expenses.

9.50 It is considered that no understatement of income adjustments are required for the following industries:

- Electricity supply
- Gas supply
- Rail transport
- Water, pipeline and other transport
- Air and space transport
- Finance
- Insurance and superannuation funds
- Ownership of dwellings
- Government administration and regulatory services and Defence

*Off-June year reporting*

9.51 Business units may report on a financial year basis other than for the year ending June, so an adjustment is required to ensure all output data are on a June financial year basis before they are used in S-U compilation. This adjustment is applied by deriving off-June factors for each data item using QBIS for each ANZSIC subdivision. The appropriate off-June factors are then applied to data items reported by individual businesses in the EAS for each ANZSIC subdivision who did not respond on a June financial year basis. Hence the data reported on an off-June financial year basis is adjusted onto a June financial year basis.

9.52 Further information can be found in the ABS publication *Experimental Estimates for Australian Industry adjusted for Off-June Year Reporting* (cat. no. 8169.0).

*Own account R&D*

9.53 An estimate for own account R&D is included to derive output. More information can be found in the ABS publication *Research and Experimental Development, Businesses, Australia* (cat. no. 8104.0).

## Intermediate consumption

9.54 Intermediate consumption (or intermediate use) consists of the value of the goods and services consumed as inputs to the production process. The goods and services may be either transformed (e.g. flour may be transformed into bread) or completely consumed or used up (e.g. electricity and most services) in the process of producing outputs.

9.55 In addition to goods and services used directly in the production process, intermediate consumption includes the value of all goods and services used as inputs into ancillary activities. Ancillary activities are undertaken within an enterprise for the sole purpose of supporting the production process. Ancillary activities include purchasing, sales, marketing, accounting, data processing, transportation, storage, and security. The output of an ancillary activity is not intended for use outside the enterprise.

9.56 Intermediate consumption does not include valuables consisting of works of art, precious metals and stones and articles made out of them, that are acquired as stores of value and are not used up in the process of production. However, intermediate consumption does include precious stones and metals used in the production of jewellery and similar items.

9.57 Intermediate consumption excludes the costs incurred by the gradual using up of fixed assets, which is recorded as consumption of fixed capital in the income and capital accounts. However, rentals paid on fixed assets that are leased from other institutional units under operating leases are included as part of intermediate consumption, along with fees, commissions, royalties, etc., payable under licensing arrangements.

### Distinction between operating leases and financial leases

9.58 *Operating leases* are leases that provide for the renting of machinery or equipment for specified periods of time that are substantially shorter than the total expected service lives of the machinery or equipment. Operating leasing is a form of production in which the owner of the machinery or equipment (the lessor) provides a service to the user (or lessee). The lessor is usually responsible for the maintenance and repair of the equipment as part of the service provided to the lessee. Rentals are treated as payment for the total service provided, and are included in the intermediate consumption of producers. For operating leases, consumption of fixed capital is charged to the lessor.

9.59 Under a *financial lease*, a change of ownership from the lessor to the lessee is deemed to have taken place, even though the leased goods legally remain the property of the lessor, at least until the lease expires. Financial leasing is an alternative to lending as a method of financing the acquisition of machinery and equipment, in which the lessor effectively makes a loan to the lessee to enable the latter to finance the acquisition of the equipment. Rentals under financial leases are treated as a combination of loan repayments and interest payments and not as part of intermediate consumption. Under a financial lease, consumption of fixed capital is charged to the lessee.

### Boundary between intermediate consumption and compensation of employees

9.60 Certain goods and services used up by producers do not enter directly into the production process but are consumed by employees working on that process. Where goods and services are provided to employees and are used by the employees in their own time and at their own discretion, the goods and services constitute remuneration in kind rather than intermediate consumption. Fringe benefits, such as the private use of company cars, airline lounge memberships, telephones and rent subsidies, fall into this category. This distinction is important, because the inclusion of remuneration in kind in compensation of employees, rather than in intermediate consumption, increases labour income and GDP.

### Boundary between intermediate consumption and gross fixed capital formation

9.61 This boundary is not always clear cut. The following provides an explanation of the treatment of particular expenditures.

Small tools

9.62 Expenditure on large items of machinery and equipment is recorded as gross fixed capital formation while regular expenditure on small durables, such as hand tools, is normally regarded as intermediate consumption.

Repairs and maintenance

9.63 The 2008 SNA recommends that ordinary maintenance and repairs of fixed assets used in production constitute intermediate consumption and that major renovations, reconstructions or enlargements of fixed assets are to be treated as gross fixed capital formation. Ordinary maintenance and repairs are necessary to ensure effective utilisation of assets over their expected service lives. Such maintenance and repairs do not change the asset or its usual level of performance. Major renovations, reconstructions or enlargements increase the performance capacity of existing assets or significantly extend their previously expected service lives. Examples are extending or enlarging existing buildings or structures and refitting or restructuring the interior of a building or ship.

Research and development

9.64 Research and development is treated as capital formation except in any cases where it is clear that the activity does not entail any economic benefit for its owner, in which case it is treated as intermediate consumption. This is a change in treatment as recommended by 2008 SNA and has been implemented in ASNA.

Mineral exploration

9.65 Expenditures on mineral exploration are not treated as intermediate consumption. Whether successful or not, they are needed to acquire new reserves and so are all treated as gross fixed capital formation.

Military equipment

9.66 Expenditure on major military equipment (such as weapon delivery systems) is treated as gross fixed capital formation in the ASNA. Expenditures on durable military items such as boots, bombs and bullets, torpedoes and spare parts, are recorded as increases in inventories on acquisition and decreases in inventories on use or disposal.

### Adjustments made to intermediate use

#### *Overstatement of expenses*

9.67 Each ANZSIC division calculation of intermediate use has a correction for the level of overstatement of expenses. The calculated value for each subdivision overstatement of expenses is removed from the division's final intermediate use estimate.

9.68 The percentage adjustment for each ANZSIC subdivision's estimated overstatement of expenses is different. The estimated overstatement of expenses are based on industry analysis conducted by the Australian Taxation Office from their audits of business income and business expenses.

9.69 It is considered that no overstatement of expenses adjustments are required for the following industries:

- Electricity supply
- Gas supply
- Water supply, sewerage and drainage services
- Rail transport
- Water, pipeline and other transport
- Air and space transport
- Motion picture and sound recording
- Broadcasting (except Internet)
- Finance
- Insurance and superannuation funds
- Ownership of dwellings
- Government administration and regulatory services
- Defence
- Education and training
- Health care and social assistance
- Heritage and creative and performing arts
- Gambling, sports and recreation.

*Off-June year reporting*

9.70 Business units may report for a non-June financial year so an adjustment is required to ensure all intermediate consumption data are on a June-year basis before they are used in S-U compilation. This adjustment is applied by matching responses from the annual Economic Activity Survey with those from the Quarterly Business Indicator Survey (QBIS) for businesses reporting on an off-June financial year.

9.71 Further information can be found in the ABS publication *Experimental Estimates for Australian Industry adjusted for Off-June Year Reporting* (cat. no. 8169.0).

*FISIM*

9.72 FISIM is recorded as part of intermediate consumption by financial intermediaries' customers, i.e. for all businesses, government and households. The FISIM output is estimated so that it can be allocated by final use (to household final consumption expenditure) and intermediate use directly. FISIM is produced for the following intermediate use categories initially:

- non-financial corporations (private, national, state and local);
- financial corporations (finance, insurance and financial auxiliaries);
- general government (national, state and local);
- unincorporated enterprises; and
- ownership of dwellings.

9.73 Estimates for FISIM produced by non-resident units and consumed by resident units (i.e. an import of goods and services) and FISIM produced by resident units and consumed by non-resident units (i.e. an export of goods and services) are obtained from BOP data. Imports are allocated to intermediate use of private non-financial and financial corporations.

9.74 Intermediate use is allocated to sector and industries as follows:

- non-financial corporations (private, national, state and local) – FISIM is allocated to industries in proportion to the sum of interest income and interest expenses from the Economic Activity Survey;
- general government – industry allocation is undertaken in proportion to non-market output of general government;
- financial corporations – allocated entirely to the Financial and Insurance Services industry;
- unincorporated enterprises – FISIM is allocated to industries in proportion to the sum of interest income and interest expenses from the Economic Activity Survey; and
- ownership of dwellings industry - allocated entirely to ownership of dwellings.

*Insurance service charge (ISC)*

9.75 ISC is recorded as part of consumption by non-life insurance corporations' customers, i.e. for all businesses, governments and households. The ISC output is estimated so that it can be allocated by final use (to household final consumption expenditure) and intermediate use directly. The ISC is estimated for the following intermediate use categories:

- non-financial corporations (private and public);
- financial corporations (finance, insurance and auxiliaries);
- general government;
- unincorporated enterprises; and
- ownership of dwellings.

9.76 Estimates for ISC produced by non-resident units and consumed by resident units (i.e. an import of goods and services) and ISC produced by resident units and consumed by non-resident units (i.e. an export of goods and services) are obtained from BOP data. Imports are allocated to intermediate use of private non-financial and financial corporations.

9.77 Intermediate use is allocated to sector and industries as follows:

- General government – industry allocation is undertaken in proportion to non-market output of general government;
- Financial corporations –allocated entirely to the Financial and insurance services industry;
- Unincorporated enterprises and public / private non-financial corporations – the ISC is allocated in proportion to insurance premiums obtained from the Economic Activity Survey; and
- Ownership of dwellings industry – allocated entirely to ownership of dwellings.

## Taxes and subsidies on products

9.78 Taxes on products are taxes that are payable on goods and services when they are produced, delivered, sold, transferred or otherwise disposed of by their producers, e.g. GST, sales tax and excise tax.

9.79 Subsidies on products are subsidies that are payable per unit of a good or service. A subsidy usually becomes payable when the good or service is produced, sold or imported, but may also be payable in other circumstances such as when a good is transferred, leased, delivered or used for own consumption or own capital formation.

## Benchmark years

9.80 The current price estimates of gross value added by industry are only produced annually. For the years from 1994-95 up to the year previous to the latest year these estimates have been compiled using S-U tables and are in balance with the expenditure estimates.

9.81 The main data source for non-financial corporations and non-profit institutions serving household in the annual benchmarks is the Annual Integrated Collection (AIC), the results of which are published in *Australian Industry* (cat. no. 8155.0). The AIC consists of a core component and a rolling component. The core component produces broad financial data and broad demographic data. The rolling component produces detailed financial data and some combination of product data, detailed demographic data and activity data.

9.82 The outputs of the core and rolling components can be directly or indirectly constructed via the following streams of work:

- the survey program - consists of mail-out questionnaires to directly collect data via the Economic Activity Survey (EAS), and includes irregular annual industry surveys such as the Wholesale Industry Survey (WIS),
- the complementary program - uses data substitution and data modelling / synthetic estimation to fulfil some of the client information needs not specifically met by the survey program,
- the case study program - centres around the use of case studies to satisfy I-O data requirements of product level detail, and
- the feasibility and research program - addresses known quality, conceptual and methodological issues impacting on data from the AIC framework. In most cases, it does not directly deliver new products or services, instead helps in the clarification and resolution of issues impacting on the quality of existing outputs or on the design and delivery of new outputs.

9.83 The tables below outline the data sources and methods used in the estimation of annual gross value added at current price estimates and volume measures by industry. They also include an outline of the data sources used to estimate the product level detail required to populate the S-U tables. References to the Economic Activity Survey as a data source encompasses the AIC program as described above.

9.84 Market output is derived for all non-financial corporations and household units covering all industries. Non-market output is derived for general government and NPISH units. General government activity is not allocated to all industries. NPISH units are concentrated in a small number of industries (i.e. Information, media and telecommunication; Professional, scientific and technical services; Administration and support services; Education and training; Health care and social assistance; Arts and recreation services; and Other services). Little, if any, NPISH activity is present in the other industries, however if there is any NPISH activity (as reported in the Economic Activity Survey) in these industries then this small amount of non-market output would be included in gross value added estimates.

Table 9.1 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Agriculture, subdivision 01

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey is the main data source used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D<br>• Gross fixed capital formation for cultivated biological resources (including livestock used for breeding, vineyards and fruit |

orchard growth)
- An inventories adjustment for finished goods and work-in-progress to account for misreporting. This adjustment is based on a post enumeration survey conducted in 2009.

**Output – product level**

Industry product estimates for primary and secondary production are modelled using the estimates calculated from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0).

Product movements are then confronted with the available product information found in the Australian Bureau of Agricultural and Resource Economics and Sciences *Agriculture and Resource Quarterly* publication and the ABS publication *Value of Agricultural Commodities Produced*, (cat. no 7503.0).

S-U estimates at product level are published in the ABS *Australian System of National Accounts*, Table 61, (cat. no. 5204.0) and they also form the basis for the product dimension that is used in the input and output tables.

**Intermediate use**

The Economic Activity Survey is the main data source used to derive intermediate use.

Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.

The following adjustments are also included to obtain intermediate use:
- Overstatement of expenses (including a deduction of 9% of intermediate use to account for over reporting. This adjustment is based on a post-enumeration survey conducted in 2009)
- Off-June year reporting
- FISIM
- Insurance service charge.

**Gross value added**

Output less intermediate use.

**Volume measures**

Derived using the double deflation method for value added.

The annual volume is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0 as well as information obtained from the media and industry associations.

For this industry, volume data are also obtained from Australian Bureau of Agricultural and Resource Economics and Sciences statistics and the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0).

Table 9.2 ANNUAL GROSS VALUE ADDED BY INDUSTRY— Aquaculture (subdivision 02), Forestry and logging (subdivision 03), Fishing, hunting and trapping (subdivisions 04) and Agriculture, forestry and fishing support services (subdivision 05)

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey and Government Finance Statistics are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Industry subdivision product estimates for primary and secondary production are modelled using weights from the input and output tables.<br><br>Secondary production estimates are derived directly from Economic Activity Survey data corresponding to the related input and output product.<br><br>Product movements are confronted according to available product information in the Australian Bureau of Agricultural and Resource Economics and Sciences, *Agriculture and Resource Quarterly* publication. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.3 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Coal mining (subdivision 06), Oil and gas extraction (subdivision 07), Metal ore mining (subdivision 08) and Non-metallic mineral mining and quarrying (subdivision 09)

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | For the year t-2 (i.e. two years prior to the reference year), the Economic Activity Survey and ABS Mining Commodities data cube (cat. no. 8155.0) are the main data sources used to derive output. For the year t-1, the Bureau of Resources and Energy Economics data, market and export data are the main data sources used to derive output.<br><br>For year t-2, output is derived using the level of production as reported in 8155.0 plus other income sourced from the Economic Activity Survey.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Own account computer software and R&D<br><br>For year t-1, industry subdivision estimates for primary and secondary production are modelled. Primary production level estimates are compiled by applying movements from Bureau of Resources and Energy Economics data, market and export data (for products predominantly exported) to the previous year's data. Secondary production is based on allocating observed Economic Activity Survey totals using previously derived shares.<br><br>The mining output derivation for commodity producing groups uses production as reported in the ABS publication *Australian Industry - Mining Commodities* (cat. no. 8155.0) aggregated to relevant products plus other income sourced from the Economic Activity Survey. |
| **Output – product level** | Product level estimates for mining for the 4 commodity producing ANZSIC groups (060 Coal mining, 070 Oil and gas extraction, 080 Metal ore mining and 090 Non-metallic mineral mining and quarrying), for years from 1994-95 to year t-2, are compiled from detailed commodity level information contained in the *Australian Industry – Mining Commodities* (cat. no. 8155.0) publication plus estimates for confidential data and brown coal production estimates from the Victorian Department of Primary Industries *Annual Statistical Review*.<br><br>Product level estimates for year t-1 are compiled from data contained in the *Australian Industry – Mining Commodities* (cat. no. 8155.0) publication for year t-2 which has been extrapolated by applying movements from Bureau of Resources and Energy Economics, market and export data. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |

| | |
|---|---|
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The annual volume is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0 as well as information obtained from the media and industry associations.<br><br>For this industry, volume data are also obtained from State government mines department data for the commodity producing groups, Coal mining, Oil and gas extraction, Metal ore mining and Non-metallic mineral mining and quarrying. |

Table 9.4 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Exploration and other mining support services, subdivision 10

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey, Government Finance Statistics and the ABS publication *Mineral and Petroleum Exploration, Australia* (cat. no. 8412.0) are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D.<br><br>Industry estimates for primary and secondary production are calculated from the ABS publication *Mineral and Petroleum Exploration, Australia* (cat. no. 8412.0) and from the Economic Activity Survey data. |
| **Output – product level** | Product level information is determined from detailed source data contained in the Mineral and Petroleum Exploration Survey and Economic Activity Survey data. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital. |

| | |
|---|---|
| | The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The annual volume is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0 as well as information obtained from the media and industry associations.<br><br>For this industry volume data are also obtained from State government mines department data for the commodity producing groups, Coal mining, Oil and gas extraction, Metal ore mining and Non-metallic mineral mining and quarrying. |

Table 9.5 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Manufacturing (division C) except subdivisions 16 (Printing), 17 (Petroleum, coal, chemical and rubber products manufacturing) & 18 (Basic chemical and chemical manufacturing)

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey is the main data source used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, case study information, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added. |

| | |
|---|---|
| | The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.6 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Printing and recording media, subdivision 16

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey and Government Finance Statistics are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, case study information, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.7 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Petroleum, coal, chemical and rubber products manufacturing, subdivision 17

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey is the main data source used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, case study information, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The annual volume is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0 as well as information obtained from the media and industry associations.<br><br>For this industry volume data are also obtained from the Department of Resources, Energy and Tourism and the Australian Institute of Petroleum. |

Table 9.8 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Basic chemical and chemical manufacturing, subdivision 18

| Item | Comment |
|---|---|
| **Output** | The Economic Activity Survey and Government Finance Statistics are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, the Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The annual volume is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0 as well as information obtained from the media and industry associations.<br><br>For this industry volume data are also obtained from the Department of Resources, Energy and Tourism and the Australian Institute of Petroleum data. |

Table 9.9 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Electricity supply, subdivision 26

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey is the main data source used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, case study information, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The annual volume is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0 as well as information obtained from the media and industry associations.<br><br>For this industry, volume data are also obtained from the Energy Supply Association of Australia and the Bureau of Resources and Energy Economics. |

Table 9.10 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Gas supply, subdivision 27

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey is the main data source used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, case study information, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The annual volume is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0 as well as information obtained from the media and industry associations.<br><br>For this industry, volume data are also obtained from the Energy Supply Association of Australia and the Bureau of Resources and Energy Economics. |

Table 9.11 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Water supply, sewerage and drainages services (subdivision 28) and Waste collection, treatment and disposal services (subdivision 29)

| Item | Comment |
|---|---|
| **Output** | The Economic Activity Survey is the main data source used to derive output for both the private and public sectors.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units. |

| | |
|---|---|
| | For this industry only general government consumption of fixed capital is added which is sourced from Government Finance Statistics data. It is required because the output for the public sector obtained from the Economic Activity Survey is measured on a cost basis therefore requiring consumption of fixed capital to be added.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. In this industry general government units are in scope of Economic Activity Survey therefore Government Finance Statistics data are not required.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, general government, households and NPISH units.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The annual volume is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0 as well as information obtained from the media and industry associations.<br><br>For this industry volume data are also obtained from the Bureau of Resources and Energy Economics, Water Supply Association of Australia and *Waste Management Services* (cat. no. 8698.0)**.** |

Table 9.12 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Construction, division E

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey is the main data source used to derive output for the Construction industry.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>In addition to this, output for construction activity that is out of scope of the Economic Activity Survey is included. This additional output relates to owner builders of new houses, alterations and additions and general government construction activity. |

The output for owner-builders of new houses is calculated by using the proportion of owner-builder activity to construction activity derived from the ABS publication *Private Sector Construction Industry, Australia 2002-03* (cat. no. 8772.0) and applying this to the construction of new houses from the ABS publication *Building Activity, Australia* (cat. no. 8752.0).

In order to calculate the output for owner builder alterations and additions, two components of alterations and additions are derived.

1. Alterations and additions undertaken by enterprises within the construction industry – the estimate from the *Private Sector Construction Industry, Australia 2002-03* (cat. no. 8772.0) is rolled forward using indicators from the ABS publication *Building Activity, Australia* (cat. no. 8752.0).
2. Alterations and additions undertaken by owner builders – an estimate derived using an independent non-ABS estimate of the value of alterations and additions, as well as ratios from *Private Sector Construction Industry, Australia 2002-03* (cat. no. 8772.0), are rolled forward using *Building Activity, Australia* (cat. no. 8752.0) This is confronted with the ABS publication *Household Expenditure Survey, Australia: Summary of Results (cat. no. 6530.0)*.

An adjustment to the output of residential construction is made to remove the value of land from sales of house and land packages. This adjustment is the percentage of land value to sales of residential construction derived from the ABS publication *Private Sector Construction Industry, Australia 2002-03* (cat. no. 8772.0) and is applied to residential construction.

The construction output for the general government sector is estimated using the ABS publication *Engineering Construction Activity, Australia* (cat. no. 8762.0). Total engineering construction by the public sector for the public sector (less engineering construction for the telecommunications and electricity industries) is added to total construction output. The telecommunications and electricity engineering construction activity is removed as this is included in the output of the telecommunications industry and electricity industry respectively.

General government consumption of fixed capital is also included in output sourced from the Perpetual Inventory Model.

The following adjustments are also included to obtain output:

- Understatement of income
- Off-June year reporting
- Own account computer software and R&D.

**Output – product level**

Industry subdivision product estimates for primary and secondary product production are modelled by using the ABS publications *Building Activity, Australia* (cat. no. 8752.0), *Engineering Construction Activity, Australia* (cat. no. 8762.0) and *Private Sector Construction Industry, Australia 2002-03* (cat. no. 8772.0).

**Intermediate use**

The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.

Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.

| | |
|---|---|
| | General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.13 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Wholesale trade, division F

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey is the main data source used to derive output.<br><br>The output for the Wholesale trade industry is equal to the trade margin realised on the goods sold. The margin is the value of sales less the value of the goods purchased for resale.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Industry subdivision product estimates for primary and secondary product production are modelled based on product level data from the Economic Activity Survey collections and the periodical industry surveys such as the *Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0). |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived from the Economic Activity Survey for non-financial corporations, households and NPISH units.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.14 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Retail trade, division G

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey is the main data source used to derive output.<br><br>The output for the Retail trade industry is equal to the trade margin realised on the goods sold. The margin is the value of sales less the value of the goods purchased for resale.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Industry subdivision product estimates for primary and secondary product production are modelled based on product level data from the Economic Activity Survey collections and the periodical industry surveys such as the *Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0). |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.15 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Accommodation and food services, division H

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey and Government Finance Statistics (for Accommodation services) are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units classified to Accommodation services (subdivision 44).<br><br>The output for the Food and beverage services subdivision is equal to the trade margin realised on the goods sold. The margin is the value of sales less the value of the goods purchased for resale.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive |

government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.

The following adjustments are also included to obtain output:

- Understatement of income
- Off-June year reporting
- Own account computer software and R&D.

**Output – product level**

Industry subdivision product estimates for primary and secondary product production are modelled based on product level data from the Economic Activity data and the periodical industry surveys such as the *Clubs, Pubs, Taverns and Bars* (cat. no. 8687.0), *Cafes, Restaurants and Catering Services* (cat. no. 8655.0) *and Accommodation Services* (cat. no. 8695.0).

**Intermediate use**

The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.

Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.

General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.

The following adjustments are also included to obtain intermediate use:

- Overstatement of expenses
- Off-June year reporting
- FISIM
- Insurance service charge.

**Gross value added**

Output less intermediate use.

**Volume measures**

Derived using the double deflation method for value added.

The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0.

Table 9.16 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Road transport, subdivision 46

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey and Government Finance Statistics are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.17 ANNUAL GROSS VALUE ADDED BY INDUSTRY IN CURRENT PRICES—Air and space transport, subdivision 49

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey is the main data source used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, case study information, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.18 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Rail transport (subdivision 47), Water transport (subdivision 48), and Other transport (subdivisions 50)

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey and Government Finance Statistics (for Other transport services) are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product and primary products are aggregated to derive industry data<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |

| | |
|---|---|
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.19 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Postal and courier pick-up and delivery services (subdivision 51), Transport support services (subdivision 52), and Warehousing and storage services (subdivision 53)

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey and Government Finance Statistics (for Transport support services) are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |

| | |
|---|---|
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.20 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Information media and telecommunications, division J

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey and Government Finance Statistics (for motion picture and video production including post production, free to air broadcasting services, wired and mobile telecommunications networks, library and archive services) are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Non-market output is measured as the costs of producing outputs including compensation of employees, the cost of purchased goods and services used in production, other taxes (less subsidies) on production and consumption of fixed capital. It is derived for general government and NPISH units.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, case study information, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use: |

| | |
|---|---|
| | • Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.21 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Finance services, subdivision 62

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | Balance sheet, income and expenditure and interest rate information are used to compile the output for the following financial intermediaries – the Reserve Bank of Australia (RBA); banks; other depository corporations (credit unions, building societies, cash management trusts, registered financial corporations); central borrowing authorities; securitisers and financial intermediaries not elsewhere classified (e.g. public unit trusts excluding property trusts; public development authorities; investment companies; common funds; co-operative housing societies; public housing schemes; and other financial corporations).<br><br>The following outlines the data sources used to estimate the various components of output:<br><br><u>Balance sheets:</u><br>• ABS ,*National Accounts, Financial Accounts* (cat. no. 5232.0);<br>• *Australian Prudential Regulatory Authority (APRA) Monthly Bank Statement of Financial Position*- detailed breakdown for bank loans and deposits;<br>• ABS, *Assets and Liabilities of Securitisers* (cat. no. 5232.0.55.001);<br>• ABS, *Managed Funds* (cat. no. 5655.0);<br>• RBA, *Statistical Bulletin*; and<br>• ABS, National accounts capital stock estimates<br><br><u>Income and expenditure</u>:<br>• RBA: *Annual Report; Financial Stability Report* (6 monthly); *Statement of Monetary Policy* (quarterly);<br>• ABS Publications: *Balance of Payments and International Investment Position (cat. no. 5302.0); Statistics of Financial Institutions* (cat. no. 5661.0) (note: cat. no. 5661.0 has ceased but for completeness it is included as the data in this publication still underpins the estimates)*;*<br>• ABS Collections - Economic Activity Survey; Quarterly Survey of Financial Information; Government Finance Statistics;<br>• Suite of Australian Prudential Regulatory Authority (APRA) forms - *Quarterly Bank Statement of Financial* Performance and *Quarterly Registered Financial Corporations Statement of Financial Performance;*<br>• Australian Prudential Regulatory Authority (APRA) publications: *Quarterly Bank Performance Statistics, Quarterly Credit Unions and Building Societies Performance Statistics*; and |

- Ad-hoc reports: annual reports for small subsectors such as listed investment companies, bank annual reports and private consultant banking reports.

Interest rates:

- RBA *Statistical Bulletin.*

Output is calculated as:

FISIM imputation
*plus* imputed output of financial intermediaries not elsewhere classified
*plus* imputed output of RBA
*plus* explicit charges
*plus* gross non-land rent and other service income (excludes property income).

The following adjustment is also included to obtain output:

- Own account computer software and R&D.

FISIM imputation

To compile the FISIM imputed estimate for all financial intermediaries (except the RBA and financial intermediaries n.e.c.), total interest receivable and payable estimates by financial instruments (i.e. deposits, bills of exchange, one-name paper, bonds and loans) and counterparty sector and subsector flows for the following 6 sectors and subsectors are compiled:

- Rest of the world;
- Reserve Bank Of Australia;
- Banks;
- Other depository corporations;
- Central borrowing authorities; and
- Securitisers.

Three datasets are required to compile the interest flows, namely:

- total interest payable and receivable;
- interest rates for relevant financial instruments of various sectors and subsectors; and
- balance sheets for the six sectors and subsectors.

The next step is to calculate FISIM for loans and deposits (banks and other depository corporations) and for loans (securitisers and central borrowing authorities). That is:

- For banks and other depository corporations, FISIM is derived as follows:

*[(counterparty loan rate - reference rate)*counterparty stock of loans] + [(reference rate - counterparty deposit rate)*counterparty stock of deposits],*
where reference rate is mid-point between the average interest rate on loans and the average interest rate on deposits.

- For securitisers and central borrowing authorities, FISIM is derived as follows:

*[(counterparty loan rate - reference rate)*counterparty stock of loans],*
where reference rate is weighted average bond yield

The above calculations are undertaken in separate loan and deposit FISIM tables for each of the four groups of FISIM generating institutions (banks, other depository corporations, central borrowing authorities and

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| | securitisers). Each table captures the counterparty sector and subsector loan and deposit balances, their respective interest flows and interest margins (i.e. reference rate – deposit rate, or loan rate – reference rate) and the subsequent FISIM estimates. |
| Imputed output of financial intermediaries not elsewhere classified | Described in Table 11.6 |
| Imputed output of the RBA | Described in Table 11.6 |
| Explicit charges | Described in Table 11.6 |
| Gross non-land rent and other service income (excludes property income) | Described in Table 11.6 |
| **Output – product level** | Product level estimates for finance services are obtained directly or modelled using the source data outlined above. |
| **Intermediate use** | Is derived residually from output at basic prices minus industry value added. |
| **Gross value added** | Sum of gross operating surplus, compensation of employees and other taxes less subsidies on production for the Finance Industry. |
| **Volume measures** | The detailed information from the current price FISIM loan and deposit tables for the four groups of financial intermediaries (i.e. banks, other depository corporations, central borrowing authorities and securitisers) are used to construct chain volume measures.<br><br>Chain volume FISIM measures are produced for the total, household final consumption expenditure, intermediate use of ownership of dwellings, intermediate use by general government, total intermediate use, exports and imports.<br>• Laspeyres chain volume estimates of balances (loans and deposits) by counterparty sectors and subsectors are calculated by deflating the current price estimates using the CPI All groups.<br>• The deflated loans and deposits are multiplied by the associated interest margin (i.e. reference rate – deposit rate, or loan rate – reference rate) for the previous year to produce estimates of FISIM in prices of the previous year.<br><br>The estimates in the previous step are summed across the four financial intermediaries to produce Laspeyres chain volume estimates of total FISIM, final use (i.e. household final consumption expenditure, exports and imports), total intermediate use, and dwellings and general government intermediate use.<br><br>Volume estimates for the rest of the Finance and Insurance Industry are derived using the double deflation method.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.22 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Insurance and superannuation funds, subdivision 63

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | Balance sheet, income and expenditure and interest rate information are used to compile the output for pension funds (superannuation), life insurance corporations (including friendly societies) and non-life (general) insurance corporations.<br><br>The following outlines the data sources used to estimate the various components of output:<br><br>Balance sheets:<br>• ABS, *National Accounts, Financial Accounts* (cat. no. 5232.0);<br>• ABS, *Managed Funds* (cat. no. 5655.0); and<br>• ABS, National accounts capital stock estimates.<br><br>Income and expenditure:<br>• ABS Collections - *Quarterly Survey of Financial Information;*<br>• Australian Prudential Regulatory Authority (APRA) form - *Quarterly Superannuation Statement of Financial Performance*;<br>• Australian Prudential Regulatory Authority (APRA) publications: *Quarterly Superannuation Performance Statistics; Quarterly Life Insurance Performance Statistics; Quarterly General Insurance Performance Statistics; Annual Superannuation Bulletin; Annual Friendly Society Bulletin; Half-Yearly General Insurance Bulletin; and Selected Statistics on General Insurance; General Insurance Supplementary Statistical Tables;*<br>• Australian Taxation Office (ATO): Self-managed superannuation funds taxation data and website releases;<br>• ABS Publications: *Balance of Payments and International Investment Position* (cat. no. 5302.0); and<br>• Ad-hoc private consultant reports: superannuation actuarial reports and real estate statistics.<br><br>Output is calculated as:<br>Insurance service charge (ISC)<br>*plus* explicit charges<br>*plus* gross non-land rent<br>*plus* non-life insurance business income<br>*plus* subsidies.<br><br>The following adjustment is also included to obtain output:<br><br>• Own account computer software and R&D. |
| Insurance service charge | Non-life insurance corporations – estimated as premiums earned plus investment income on the technical reserves less expected claims:<br>• premiums earned include direct premiums earned plus inward reinsurance premiums less outward insurance premiums and statutory charges paid;<br>• premium supplements represent income earned on the technical reserves of non-life insurance corporations, which consist of unearned premiums (most premiums are paid for a full year in advance) and claims incurred but not yet paid (which arise because of delays in claims being lodged and assessed, and in finalising the payment of claims);<br>• premium supplements do not include any income from the investment of insurance corporations' own funds. The proportion of policy-holders' funds to total assets of non-life |

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| | insurance corporations is applied to total investment income to derive premium supplements. The interest share of investment income is net of FISIM. |
| | Life insurance corporations – the sum of administrative costs incurred (including investment and labour costs) plus a profit margin; the profit margins is calculated by estimating a proxy return on equity.<br><br>Pension funds – the sum of administrative costs incurred (including investment and labour costs). |
| Explicit charges | Described in Table 11.7 |
| Gross non-land rent | Described in Table 11.7. It is assumed to be applicable only to commercial buildings and infrastructure. |
| **Output – product level** | Product level estimates for insurance services are obtained directly or modelled using the source data outlined above. |
| **Intermediate use** | Is derived residually from output at basic prices minus industry value added. |
| **Gross value added** | Sum of gross operating surplus, compensation of employees and other taxes less subsidies on production for the Insurance Industry. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.23 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Auxiliary finance and insurance services, subdivision 64

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey is the main data source used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Own account computer software and R&D. |
| **Output – product level** | Industry subdivision product estimates for primary and secondary product production are modelled by using directly measured product levels from Economic Activity Survey collections and periodical industry product surveys. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM |

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| | • Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.24 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Rental, hiring and real estate services, division L

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey and Government Finance Statistics are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |

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| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.25 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Professional, scientific and technical services, division M

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey and Government Finance Statistics are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Non-market output is measured as the costs of producing outputs including compensation of employees, the cost of purchased goods and services used in production, other taxes (less subsidies) on production and consumption of fixed capital. It is derived for general government and NPISH units.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, case study information, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |

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| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.26 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Administration and support services, division N

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey and Government Finance Statistics are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Non-market output is measured as the costs of producing outputs including compensation of employees, the cost of purchased goods and services used in production, other taxes (less subsidies) on production and consumption of fixed capital. It is derived for general government and NPISH units.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income, for only Building cleaning, pest control and other support services (subdivision 73)<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses, for only Building cleaning, pest |

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| | control and other support services (subdivision 73)<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.27 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Public administration and safety, division O

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey and Government Finance Statistics are the main data sources used to derive output.<br><br>Gross expenditure data taken from Government Finance Statistics, from which industry based data are derived using a set of proportions derived from historical input and output data and with no secondary production assumed. Government Finance Statistics data are also adjusted to include national accounts data for FISIM, artistic originals and consumption of fixed capital. A consolidation adjustment for payroll tax is also included.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for output of Investigation and security services (ANZSIC class 7712).<br><br>The following adjustments are also included to obtain output:<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | Output minus total primary inputs (i.e. compensation of employees, gross operating surplus and other taxes less subsidies on production).<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for units classified to Investigation and security services (ANZSIC class 7712). |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.28 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Education and training, division P

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey and Government Finance Statistics are the main data sources used to derive output.<br><br>General government output is the most significant component of output for this industry. Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Non-market output is measured as the costs of producing outputs including compensation of employees, the cost of purchased goods and services used in production, other taxes (less subsidies) on production and consumption of fixed capital. It is derived for general government and NPISH units.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the output volume method for non-market producers.<br><br>The output volume method is based on total numbers of students at both private and government schools, student load of universities, course hours for TAFE and other vocational education providers stratified |

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| | at various levels of education and weighted together by their respective current price value of expenditures.<br><br>Student numbers are sourced from the ABS publication *Schools, Australia (*cat. no. 4221.0), Department of Education, Employment and Workplace Relations education annual reports for school and university students, and data from the National Centre for Vocational Education Research for vocational students**.** |

Table 9.29 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Health care and social assistance, division Q

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The industry output consists of significant amounts of both private and public expenditures. The industry output is measured by the demand side approach which sums the intermediate consumption of health and social assistance related products and final demand (i.e. final consumption expenditure, and exports less imports). These are sourced from the Economic Activity Survey, Government Finance Statistics, Household Expenditure Survey and Pharmaceutical Benefits Scheme data from the Department of Health and Ageing.<br><br>The private sector output estimates are based on household final consumption expenditure, intermediate consumption and exports and imports of health care and social assistance related products.<br><br>The public sector output estimates are based on the costs of production recorded for government final consumption expenditure on health care and social assistance related products, but before any receipts from sales are netted off.<br><br>The following adjustment is also included to obtain output:<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, case study information, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | Output minus total primary inputs (i.e. compensation of employees, gross operating surplus and other taxes less subsidies on production). |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the output volume method for non-market producers.<br><br>The output volume method is based on private and public hospital separations and number of non-hospital services provided, stratified at various levels of procedure type, and weighted together by their respective current price value of expenditures.<br><br>Public and Private Hospital separations by procedure type and average separation costs are sourced from the Australian Institute of Health and Welfare hospital publication. The number of Non-hospital services provided and costs are sourced from Medicare, Private Health Insurance Administration Council and the Productivity Commission *Report on Government Services*. |

Table 9.30 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Arts and recreation services, division R

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey, Government Finance Statistics and components of total use are the main data sources used to derive output.<br><br>Market output is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>Non-market output is measured as the costs of producing outputs including compensation of employees, the cost of purchased goods and services used in production, other taxes (less subsidies) on production and consumption of fixed capital. It is derived for general government and NPISH units.<br><br>Gambling activity output is calculated by adding household final consumption expenditure, government final consumption expenditure and exports and subtracting imports and taxes on products.<br><br>Government Finance Statistics data relating to gross expenditure by government classified according to purpose are used to derive government output by industry. Purpose categories are used as a proxy for both product and industry, with ratios derived from historical input and output data used to allocate each purpose category to product. Primary products are aggregated to derive industry data.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey is the main data source used to derive intermediate use. General government intermediate use is derived residually with the components coming from various sources, namely Government Finance Statistics, Survey of Employment and Earnings and the Perpetual Inventory Model.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>Intermediate use for gambling services, however, is derived as output minus total primary inputs (i.e. compensation of employees, gross operating surplus and other taxes less subsidies on production).<br><br>General government intermediate use is included and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use: |

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| | • Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.31 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Other services, division S

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The Economic Activity Survey, Government Finance Statistics and components of total use are the main data sources used to derive output.<br><br>Output for personal and other services is derived using the demand side compilation method as opposed to supply side. Output is estimated as the sum of intermediate use and final use (i.e. household and government final consumption expenditures, exports less imports) less taxes on those products primary to the industry.<br><br>Market output for repairs and maintenance services is measured as sales of goods and services plus changes in inventories of finished goods and work-in-progress. It is derived for non-financial corporations and household institutional units.<br><br>The following adjustments are also included to obtain output:<br>• Understatement of income<br>• Off-June year reporting<br>• Own account computer software and R&D. |
| **Output – product level** | Product estimates for both primary and secondary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, extrapolated estimates based on the previous year's estimates, the distribution from the latest input and output tables and the assumption that the products produced are primary to activities of the ANZSIC class reporting the activity. |
| **Intermediate use** | The Economic Activity Survey and Government Finance Statistics are the main data sources used to derive intermediate use.<br><br>Intermediate use consists of the value of goods and services consumed as inputs in the production of output. It is derived for non-financial corporations, households and NPISH units.<br><br>General government intermediate use is included for funeral and parking services and is derived as the general government estimates for gross output less compensation of employees less consumption of fixed capital.<br><br>The following adjustments are also included to obtain intermediate use:<br>• Overstatement of expenses<br>• Off-June year reporting<br>• FISIM<br>• Insurance service charge. |
| **Gross value added** | Output less intermediate use. |

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| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

Table 9.32 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Ownership of dwellings

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | The components of final use are the main data sources used to derive output.<br><br>Estimates of the output are derived using a demand side method. The household final consumption expenditure as derived from the actual rents model is combined with government final consumption expenditure, minus imports, plus exports, minus taxes less subsidies on products to form total industry output. |
| **Output – product level** | Product estimates for primary production at the industry level are modelled based on a variety of sources. These sources include, but are not restricted to, the distribution from the latest input and output tables, ABS publication *Tourist Accommodation, Australia* (cat. no. 8635.0) (for long term caravan parks) and the assumption that the products produced are primary to activities of the Ownership of dwelling industry. |
| **Intermediate use** | Intermediate use for the ownership of dwellings industry includes the following components:<br>• repairs and maintenance;<br>• building insurance service charge;<br>• FISIM; and<br>• real estate agent commissions charged for the management of rental properties;<br>• loan application fees; and<br>• miscellaneous expenses<br><br>Repairs and maintenance are benchmarked from the ABS's periodic household expenditure survey. The benchmarks are extrapolated using a combined indicator based on the estimated number of dwellings (the same estimate as used to estimate total dwelling rent) and movements in appropriate component price indexes from the consumer price index (CPI) and the series on Metropolitan and municipal improvement rates from the Government Finance Statistics.<br><br>In this context repairs and maintenance cover the actual repairs to the dwelling and preventative maintenance such as painting internal and external surfaces. However, purchases of goods and services associated with cleaning a dwelling are not included (they are recorded as part of household final consumption expenditure).<br><br>Estimates for building insurance service charges (premiums plus premium supplements less expected claims) are derived from annual data published by the Australian Prudential Regulatory Authority (APRA).<br><br>FISIM is the imputed financial service charge component of interest payable on loans used to finance the purchase of dwellings owned by persons. Estimates are derived from data published by APRA. The derivation of FISIM estimates is described in Table 9.21 ANNUAL GROSS VALUE ADDED BY INDUSTRY— Finance services, subdivision 62. |

| | |
|---|---|
| | Estimates for real estate agents' management fees are derived using data from the 2011 Census of population and housing to estimate the proportion of actual rent controlled by real estate agents, extrapolated by number of dwellings for non-census years. This proportion is applied to actual rent and multiplied by the average commission rate for each state.<br><br>Estimates for loan application fees for loans from financial corporations to purchase dwellings are derived from sum of direct charges associated with dwellings which are obtained from Australian Prudential Regulatory Authority. |
| **Gross value added** | Output less intermediate use. |
| **Volume measures** | Derived using the double deflation method for value added.<br><br>The first preliminary estimate is confronted with the sum of the four quarters volume estimate published in cat. no. 5206.0. |

### Latest year

9.85 For all industries, except agriculture, finance services and insurance services, annual GDP(P) for the latest year (i.e. the year beyond the S-U period) is derived by aggregating the quarterly data previously derived, using largely the same set of sources and methods as those used to derive quarterly gross value added estimates.

9.86 For the latest year, volume estimates for the Agriculture industry (subdivision 01) are obtained by double deflation.

9.87 For the latest year, for Finance (subdivision 62), chain volume estimates of FISIM are produced using data sources and methodology as described for the annual benchmarks and used as an annual indicator series to move forward the benchmark volume estimate for gross value added for Finance.

9.88 For the latest year, for Insurance (subdivision 63), current price estimates of total output of insurance are produced using data sources and methodology as described for the annual benchmarks. The current price annual insurance output is deflated by the all groups consumer price index (CPI) to produce an annual chain volume indicator series for insurance which is then used to move forward the benchmark for gross value added for Insurance.

SOURCES AND METHODS – QUARTERLY

9.89 As mentioned previously, current price estimates of gross value added by industry are only produced annually. Therefore on a quarterly basis only chain volume measures of gross value added by industry are produced.

9.90 They are derived by interpolating and extrapolating annual benchmarks using quarterly indicator series. Both the annual benchmarks and the quarterly indicators are calculated as chain volume measures.

9.91 Quarterly chain volume indicators of gross value added in the ASNA are derived using three different methods:

- the output indicator method;
- double deflation; and
- the input indicator method.

9.92 The method selected to obtain chain volume measures for a particular industry depends on the data available in respect of that industry. The most commonly used method is the output indicator method. However, Agriculture uses the double deflation method. The input indicator method involves extrapolation using a measure of labour input such as hours worked, and is used to obtain estimates for Government administration and safety.

9.93 The use of output or input indicator methods is based on the implicit assumption that movements in output and intermediate use are consistent with each other. Whilst this is almost certainly not the case in practice, the assumption is made owing to limitations of quarterly source data as well as the time available for compilation and editing. Double deflation is applied to agriculture as prices and volumes for both agricultural inputs and outputs can be highly volatile. This level of volatility does not exist for other industries and, while it is arguable that quarterly double deflation would improve the estimates of GDP(P) for other selected industries, it is not clear the improvement would be significant.

9.94 The output indicator method is the one most commonly used by the ABS. It involves extrapolating reference year estimates of current price gross value added using movements in a volume indicator of output. It assumes that the ratio of gross output volumes to intermediate input volumes remains constant over time. In a few cases the output indicator is just a single statistic, but in most cases it is a combination of several statistics. In no cases do these output statistics precisely meet the national accounts definition of output, but in most cases they approximate the national accounts definition reasonably closely. In some cases the output statistics are merely highly correlated with the national accounts definition of output, as when turnover data are used as the output indicator for wholesale and retail trade. The principal output of these industries is their margin on the goods they sell (the margin is the difference between the price at which goods are sold and the price at which those goods are bought by the wholesaler or retailer). When a margin volume is estimated using a turnover volume as the indicator, the underlying assumption is that the ratio of the margin to the turnover volume is fixed over time.

9.95 Most industries produce many different commodities, and the ratio of output to value added can differ appreciably between industries and over time. Hence, in constructing a composite output indicator to be used as an indicator of growth in real value added, it is best for the constituent output statistics to be weighted together using current price value added data, and for re-weighting to occur as frequently as possible. The availability of current price value added data varies considerably between industries.

9.96 The volume estimates of gross value added for each industry are derived in the prices of the previous year. Chaining takes place after aggregation.

9.97 Quarterly current price sales data reported by survey respondents are aligned to concepts embedded in the Australian equivalents to International Financial Reporting Standards (AIFRS), net of the Goods and Services Tax (GST), and net of any discounts provided. In addition to income from sales of physical goods, sales estimates include sales of services, including consulting services, income from exports, income from leasing and hiring, income from contracts and commissions, sponsorship income, management fees and charges, income from operating leases, delivery charges, income from royalties pertaining to original artistic works, and billed progress payments from long-term contractual arrangements. They exclude items such as interest income, sales of assets, income from finance leases, payments under hire purchase arrangements, and royalties received in respect of natural resource ownership.

9.98 Inventories are also recorded according to AIFRS, and are closing book values, exclusive of GST, measured before deduction of provisions for losses. These also cover domestic activity only, and are collected according to three categories:

1. Inventories of raw materials - this includes materials and fuels designed to be consumed in productive activities, non-capitalised spare parts designated for use in fixed assets, and containers and packaging materials. Inventories of fuels for sale are excluded (these are classified as inventories of finished goods).

2. Inventories of work-in-progress - this includes partially processed or fabricated goods which will be further processed prior to sale, and general work-in-progress less payments billed. Prepayments are excluded.

3. Inventories of finished goods - this includes goods manufactured or processed which are ready for sale, goods purchased from other businesses which are ready for resale without further processing, and fuels for sale. Hired goods, inventories of land, and rented or leased buildings are excluded.

9.99 For many industries, quarterly industry gross value added is estimated in the latest year by making two assumptions: firstly, that sales growth is a proxy for output growth (in the case of manufacturing, growth in sales plus change in inventories (excluding raw materials) is a proxy for output growth), and that, if we assume movements in output and intermediate consumption are consistent with each other, that output growth is a proxy for growth in gross value added. This is the essence of the output indicator method.

9.100 Ideally, output growth would be better approximated by sales growth plus change in inventories (excluding raw materials) for all industries relying on QBIS data. However, change in inventories is only included for the derivation of estimates for manufacturing. See Table 9.42 for the rationale.

9.101 The tables below outline the data sources and methods used in the extrapolation of quarterly gross value added chain volume estimates by industry from the balanced annual supply and use data, as well as the quarterly distribution of annual supply and use estimates.

Table 9.33 QUARTERLY DATA SOURCES OF GROSS VALUE ADDED BY INDUSTRY—Agriculture, subdivision 01

| Item | Comment |
|---|---|
| General | *Updating of source data*: The Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* annual data are revised during the March quarter with the release of the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0). During this process the new farm forecast for the current year provided by the Australian Bureau of Agricultural and Resource Economics and Sciences is incorporated into the time series.<br><br>*Quarterly apportionment of annual data*: Annual data are split across the four quarters using weights that reflect the estimated production of that commodity throughout the year, e.g. wheat is harvested in December and March quarters, not in June or September quarters. For some commodities quarterly data sources are available, including: sheep, lambs, cattle, calves, pigs, poultry, goats, milk, and wool. |
| **Gross Output** | |
| **Livestock** | |
| **Sheep, lambs, cattle & calves** | Gross value of production for sheep, lambs, cattle and calves is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication and quarterly data from the ABS publication *Livestock Products, Australia* (cat. no. 7215.0). |
| **Pigs, deer, poultry for slaughtering and egg laying hens** | Gross value of production for pigs, deer, poultry for slaughtering and egg laying hens is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication and quarterly data from the ABS publication |

*Livestock Products, Australia* (cat. no. 7215.0).

**Pets and live animals n.e.c.**

Gross value of production for pets and live animals n.e.c. is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication and quarterly data from the ABS publication *Livestock Products, Australia* (cat. no. 7215.0).

**Milk, eggs and honey**

**Milk**

Gross value of production for milk is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication.

**Eggs and honey**

Gross value of production for eggs is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication and quarterly data from the ABS publication *Livestock Products, Australia* (cat. no. 7215.0). Data for honey is no longer available in *Value of Agricultural Commodities Produced* so the Australian Bureau of Agricultural and Resource Economics and Sciences estimates are used instead.

**Wool**

Inventories of wool are estimated using Australian Wool Exchange (AWEX) data (average bale weight, average greasy wool price and total sales).

Gross value of production for wool is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication.

**Grains**

**Cereal grains**

**Wheat**

Gross value of production for wheat is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication.

**Barley, oats, rice, sorghum & cereal grains n.e.c.**

Gross value of production for barley, oats, rice, sorghum and cereal grains n.e.c. is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication.

**Other grains n.e.c.**

Gross value of production for other grains n.e.c. is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication.

**Total other crops**

| | |
|---|---|
| **Fodder & grass** | Gross value of production for fodder and grass is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication. |
| **Plants & flowers** | Gross value of production for plants and flowers is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication. |
| **Fruit, nuts & vegetables** | Gross value of production for fruits, nuts and vegetables is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication. |
| **Sugar cane** | Gross value of production for sugar cane is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication. |
| **Other agriculture (includes cotton, wine grapes, hops and tobacco output (Note: tobacco production ceased in Australia since 2006/07))** | Gross value of production for other agriculture is estimated using price and quantity data from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0), supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication. |
| **Miscellaneous agriculture** | |
| **Sheep & beef cattle agistment Services** | Gross value of production for sheep and beef cattle agistment services is derived using the gross value of production of sheep, lambs, cattle and calves. |
| **Livestock products n.e.c., horse agistment services** | Gross value of production for livestock products n.e.c. and horse agistment services is estimated using price and quantity data published in the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication. |
| **Non-agricultural products (production which is secondary to agriculture)** | Gross value of Agriculture industry production for non-agricultural products (e.g. maintenance of farm infrastructure such as barns and fences, on-farm meat processing, road freight transport etc.) is derived from the growth in the value of total agricultural production. |
| Intermediate use | |
| **Marketing costs** | |
| **Wheat** | Marketing costs are derived from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0) publication. They are calculated by taking the local value of production of wheat from the gross value of production. |
| **All other** | Marketing costs are derived from the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0) publication. They are calculated by taking the local value of production for a commodity from the gross value of production. |
| **Seed & fodder** | Seed costs are derived using the Australian Bureau of Agricultural and Resource Economics and Sciences data from *Agricultural Commodities* publication for area sown multiplied by corresponding seeding rates multiplied by the price per tonne. Fodder costs are derived as a residual after deducting the value of exports and non-fodder uses for these products from the gross value of production. |

| | |
|---|---|
| **Other input costs** | Historical data for farm costs such as chemicals, electricity, fuel and maintenance are moved forward using data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication. These data were originally collected in the ABS Agricultural Finance Survey (AFS) but this collection ceased in 2001. |

Table 9.34 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—Agriculture, subdivision 01

| Item | Comment |
|---|---|
| **Gross value added** | The double deflation method is used. Prior to chaining, volume measures of output and intermediate input in the prices of the previous year are derived, as described below, with the difference between the two components being the gross value added volume. |
| **Gross output** | Volume measures of output in the prices of the previous year for most commodities are derived by quantity revaluation. Volume measures of output in the prices of the previous year for the remaining commodities are derived by deflation using implicit price deflators obtained for similar commodities. |
| **Intermediate use** | The sum of marketing costs, fodder, seed, fertiliser and other intermediate inputs (fuel, maintenance of plant and structures, chemicals, insurance, etc.), as described below. |
| **Marketing costs** | Volume estimates in the prices of the previous year are derived for 13 commodity groups by using chain volume measures of the output of each group to extrapolate the previous year's current price value and then summing the results. |
| **Fodder & seed** | Manufactured fodder is re-valued by using relevant components from *Price Indexes of Articles Produced by Manufacturing Industry, Australia* (cat. no. 6412.0). All other components are re-valued using price indexes derived from unit price data which have been adjusted in some cases to allow for timing differences between production of the commodities and their use as fodder or seed. |
| **Other intermediate inputs** | Fertiliser volume estimates in the prices of the previous year are derived by quantity revaluation. For other components, current price estimates are re-valued using the relevant component indexes from Index of Prices Received and Paid by Farmers in *Agricultural Commodities* published by the Australian Bureau of Agricultural and Resource Economics and Sciences. |

Table 9.35 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Aquaculture (subdivision 02) and Fishing, hunting and trapping (subdivision 04)

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by linear trend interpolation of annual estimates.<br><br>Annual volume estimates are obtained by quantity revaluation of the major commodities using quantity data from *Agricultural Commodities* published by the Australian Bureau of Agricultural and Resource Economics and Sciences.<br><br>Note that commercial fishing activities reflect only part of subdivision 04. There is no quarterly data source to reflect the remainder of this subdivision, i.e. hunting and trapping. |

Table 9.36 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Forestry and logging, subdivision 03

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by linear trend interpolation of annual estimates.<br><br>Annual volume estimates in the prices of the previous year are derived by quantity revaluation using current price gross value of production and production quantities for total softwood and hardwood logs as published in *Agricultural Commodities* published by the Australian Bureau of Agricultural and Resource Economics and Sciences. |

Table 9.37 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Agriculture, forestry and fishing support services, subdivision 05

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by price deflation of current price values for cotton ginning, shearing and other services.<br><br>Shearing current price values are estimated using quarterly estimates of the value of shorn wool production. Cotton ginning and other services are estimated using annual production values for cotton and total farm production, respectively, from *Agricultural Commodities* published by the Australian Bureau of Agricultural and Resource Economics and Sciences. These are then averaged across the four quarters of the year to derive the quarterly current price values. Cotton ginning and shearing price indexes are based on the hourly wage rates while the other services price deflator is the CPI All groups. |

Table 9.38 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Coal mining, subdivision 06

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>The Bureau of Resources and Energy Economics provides quarterly production estimates of raw black coal (in megatonnes). These estimates are preliminary and unpublished at the time the quarterly national accounts are compiled, but are subsequently published by the Bureau of Resources and Energy Economics in *Resources and Energy Statistics*. Revisions in the published Bureau of Resources and Energy Economics data are subsequently incorporated into the quarterly national accounts. An in-house estimate of quarterly brown coal production is made, as brown coal production estimates are only available from the Bureau of Resources and Energy Economics annually. |

Table 9.39 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Oil and gas extraction, subdivision 07

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>The primary data source is monthly production volumes of oil and gas, published by the Department of Resources, Energy and Tourism in their electronic publication *Australian Petroleum Statistics*. The specific output indicators used are (a) total crude oil and condensate, in megalitres; (b) ethane, in millions of cubic metres; and (c) natural gas, in millions of cubic metres. |

Table 9.40 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Metal ore mining, except iron ore mining, (subdivision 08) and Non-metallic mineral mining and quarrying (subdivision 09)

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>The Bureau of Resources and Energy Economics (BREE) provides quarterly production estimates of copper (kilotonnes), nickel (kilotonnes), zinc (kilotonnes) and gold (tonnes) produced. These estimates are preliminary and unpublished at the time the quarterly national accounts are compiled, but are subsequently published by the Bureau of Resources and Energy Economics in *Resources and Energy Statistics*. Revisions in the published the Bureau of Resources and Energy Economics data are subsequently incorporated into the quarterly national accounts.<br><br>The Bureau of Resources and Energy Economics publication *Resources and Energy Statistics* provides the output indicator data for other commodities such as bauxite, alumina, tin, silver, uranium and manganese, as well as mineral sands such as ilmenite, rutile and zircon. Data relating to these commodities are generally not available for the most recent quarter. A preliminary estimate for the current quarter is generated for each of these commodities using a simple average of production for the same quarter in the recent past. These preliminary estimates are then replaced by published BREE data in the subsequent quarter. Revisions in the published BREE data are also incorporated.<br><br>Weights applied to each commodity within this industry are derived from *Australian Industry*, (cat. no. 8155.0).<br><br>ANZSIC classes not covered by an output indicator as described above are assumed to have the same quarterly growth rate as the classes that are measured. |

Table 9.41 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Iron ore mining (class 0801)

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>The Bureau of Resources and Energy Economics (BREE) provides quarterly production estimates of iron ore and concentrate (kilotonnes) produced. These estimates are preliminary and unpublished at the time the quarterly national accounts are compiled, but are subsequently published by the Bureau of Resources and Energy Economics in *Resources and Energy Statistics*. Revisions in the published the Bureau of Resources and Energy Economics data are subsequently incorporated into the quarterly national accounts. |

Table 9.42 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Exploration and other mining support services, subdivision 10

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy for output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.43 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Manufacturing (all subdivisions (11-25), except 17)

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales plus change in inventories (work-in-progress and finished goods) from the Quarterly Business Indicator Survey, and applying the same level of growth. This assumes that sales growth is a reliable proxy of output growth, and that growth in output and intermediate consumption occur at identical rates.<br><br>The inclusion of change in inventories generates a more conceptually correct measure of output growth than just growth in sales. Change in inventories is only included in the quarterly output indicator for manufacturing because, for all other industries relying on the Quarterly Business Indicator Survey, change in inventories is small when compared with sales volumes (and for most service industries, inventories of work-in-progress and finished goods are so insignificant they are not measured). |

Table 9.44 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Petroleum and coal product manufacturing, subdivision 17

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method<br><br>Volume measures, in the prices of the previous year, are obtained by revaluing quantity data for a range of petroleum and coal products, published in *Australian Petroleum Statistics.* |

Table 9.45 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Electricity supply, subdivision 26

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>Electricity produced in NSW, Victoria, Queensland, Tasmania and SA is obtained from the Australian Energy Market Operator, whereas electricity produced in WA is obtained from the Independent Market Operator of WA. Electricity produced in the ACT and NT are excluded from the indicator series, and therefore are not reflected in the quarterly growth rates. These two jurisdictions comprise less than 1% of national output so the extra effort to incorporate them would not result in materially improved statistical output. |

Table 9.46 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Gas supply, subdivision 27

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy for output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.47 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Water supply, sewerage and drainage services, subdivision 28

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>The current price indicator series is quarterly sales revenue data for public authorities classified to the water services industry, sourced from the Government Finance Statistics collection. The indicator series is not published in its own right. The volume data are derived by deflating this current price data with the same deflator applied to Quarterly Business Indicators Survey sales for water services which is then chained.<br><br>The reason Quarterly Business Indicators Survey data are not used to measure water services on a quarterly basis is that most water services units are classified to the public sector, and are therefore out of scope of Quarterly Business Indicators Survey. The choice to use Government Finance Statistics instead of Quarterly Business Indicators Survey means that any privately-owned water services units, such as regional irrigators, are not reflected in the quarterly growth rates. |

Table 9.48 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Waste collection, treatment and disposal services, subdivision 29

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy for output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.49 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Building construction (subdivision 30) and Heavy and civil engineering construction (subdivision 31)

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>Volume measures of the value of work done for non-residential building construction and heavy and civil engineering construction are compiled using volume indicators obtained from *Building Activity, Australia* (cat. no. 8752.0) and *Engineering Construction Activity, Australia* (cat. no. 8762.0), whereas residential building construction volume measures are compiled using volume indicators derived from private gross fixed capital formation. |

Table 9.50 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—Construction services, subdivision 32

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy for output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.51 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Wholesale trade, division F

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth. This assumes that sales growth is a reliable proxy of output growth, and that growth in output and intermediate consumption occur at identical rates.<br><br>Measuring gross value added for the wholesale trade industry is problematic on a quarterly basis. Conceptually, output for the wholesale trade industry is equal to the margin between the value at which goods are acquired and at which goods are on-sold, after allowing for inventory valuation adjustments. However, there are no appropriate data sources for measuring wholesale trade margins on a quarterly basis. Additionally, to derive volumes of margins, price indexes which are directly applicable to measurement of change in margins would be required, but these also do not exist. In using the Quarterly Business Indicator Survey sales chain volume growth rates as an indicator of growth in gross value added, the additional assumption is made that margins volumes move in line with sales volumes. |

Table 9.52 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Motor vehicle and motor vehicle parts retailing (subdivision 39) and Fuel retailing (subdivision 40)

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>Estimates of growth in gross value added for motor vehicle retailing and fuel retailing are based on growth in current price expenditure data for purchase of vehicles, and operation of vehicles, by households. These are deflated and chained to create a chain volume indicator series. This assumes that growth in these household expenditure categories is a reliable proxy for output growth, and that growth in output and intermediate consumption occur at identical rates.<br><br>Measuring gross value added for the retail trade industry is problematic on a quarterly basis. Conceptually, output for the retail trade industry is equal to the margin between the value at which goods are acquired and at which goods are on-sold, after allowing for inventory valuation adjustments. However, there are no appropriate data sources for measuring retail trade margins on a quarterly basis. Additionally, to derive volumes of margins, price indexes which are directly applicable to measurement of change in margins would be required, but these also do not exist. In using the household expenditure chain volume growth rates as an indicator of growth in gross value added for retail trade in motor vehicles, the additional assumption is made that margins volumes move in line with expenditure volumes. |

Table 9.53 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Food retailing (subdivision 41), Other store-based retailing (subdivision 42) and Non-store retailing and retail commission-based buying and/or selling (subdivision 43)

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>Estimates of growth in gross value added for these subdivisions of Retail Trade are based on quarterly volume turnover growth rates published each quarter in the Retail Trade Survey (cat. no. 8501.0). This assumes that growth in these retail turnover categories is a reliable proxy for output growth, and that growth in output and intermediate consumption occur at identical rates.<br><br>Measuring gross value added for the retail trade industry is problematic on a quarterly basis. Conceptually, output for the retail trade industry is equal to the margin between the value at which goods are acquired and at which goods are on-sold, after allowing for inventory valuation adjustments. However, there are no appropriate data sources for measuring retail trade margins on a quarterly basis. Additionally, to derive volumes of margins, price indexes which are directly applicable to measurement of change in margins would be required, but these also do not exist. In using the Retail Trade chain volume turnover growth rates as an indicator of growth in gross value added, the additional assumption is made that margins volumes move in line with turnover volumes. |

Table 9.54 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Accommodation and food services, division H

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy of output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.55 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Road transport, subdivision 46

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy of output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.56 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Rail transport, subdivision 47

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>Private sector activity is measured using sales data, in current and constant prices, from the Quarterly Business Indicators Survey. Public sector activity is measured using expenditure on rail fares as reflected in household final consumption expenditure, in current and constant prices. The current and constant price values for public and private are aggregated to form total current and constant price values for rail transport. These are then chained to form the indicator for the whole subdivision. |

Table 9.57 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Air and space transport, subdivision 49

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>A quarterly output indicator is compiled in-house, based on data from a survey of revenue passenger kilometres and freight tonne kilometres from the major domestic and Australian-based international airlines.<br><br>The term revenue passenger kilometres is a measure of traffic and is derived by multiplying the number of revenue-paying passengers by distances travelled. Calculations are made by the providers. Revenue passenger kilometres is considered to be a more accurate volume estimator for output given it is a combined measure of distances travelled as well as passengers carried. The same measurement principle applies for deriving freight tonne kilometres. |

Table 9.58 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Water transport (subdivision 48) and Other transport (subdivision 50)

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy of output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.59 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Postal and courier pickup and delivery services, subdivision 51

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>Private sector activity (reflecting private courier services, etc.) is measured using Quarterly Business Indicators Survey sales data, in current and constant prices. Public sector activity is measured using a variety of indicator data from providers on sales revenue in current prices, as well as quantities of letters and parcels carried. The current and constant price values for public and private are aggregated to form total current and constant price values for this subdivision. These are then chained to form the indicator for the whole subdivision. |

Table 9.60 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Transport support services (subdivision 52) and Warehousing and storage services (subdivision 53)

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy of output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.61 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Information media and telecommunications, division J

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy of output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.62 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Finance, subdivision 62

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>Chain volume measures for quarterly bank financial intermediation services indirectly measured (FISIM) are compiled using bank balance sheets (*ABS National Accounts, Financial Accounts,* (cat. no. 5232.0)); detailed breakdown for bank loans and deposits (Australian Prudential Regulatory Authority (APRA) *Monthly Banking Statistics*); income and expenditure (Suite of APRA forms - *Quarterly Bank Performance Statistics*); and indicator interest rates (Reserve Bank of Australia *Statistical Bulletin*). The methodology is the same as described for the annual benchmarks for FISIM.<br><br>Chain volume estimates of bank FISIM are the quarterly indicator series for gross value added. |

Table 9.63 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Insurance and superannuation funds, subdivision 63

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>Current price estimates of the Insurance service charge (ISC) are compiled as follows:<br><br>• Life insurance - The quarterly source data indicator is the operating expenses for total life insurance businesses sourced from the Quarterly Life Insurance Performance Statistics published by the Australian Prudential Regulatory Authority. Data for the most recent quarter are not available. As a result, the current quarter source data indicator is derived by using the same movement as in the corresponding quarter of the previous year. The quarterly life insurance ISC indicator is then calculated by using the quarterly movement of the indicator source data to extrapolate the previous quarter's life insurance ISC indicator level.<br><br>• Pension funds - There are two quarterly source data indicators used for pension funds. Total investment expenses and total operating expenses of pension funds are sourced from the Quarterly Superannuation Performance Statistics report published by the Australian Prudential Regulatory Authority. Data for the most recent quarter are not available. As a result, the current quarter source data indicator is derived by using the same movement as in the corresponding quarter of the previous year. The quarterly pension fund ISC indicator is then calculated by using the quarterly movement of the indicator source data to extrapolate the previous quarter's pension fund ISC indicator level.<br><br>• Non-life insurance - The non-life insurance ISC indicator is estimated via a linear trend interpolation of the annual estimates.<br><br>A weighted sum of the three components is derived to produce a quarterly current price indicator of the ISC. This is deflated using the CPI All groups index and chained to produce a chain volume series.<br><br>Revisions with a one-quarter lag are usual in this subdivision, owing to the replacement of internal current quarter estimates with data published by the Australian Prudential Regulatory Authority. |

Table 9.64 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Auxiliary finance and insurance services, subdivision 64

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy of output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.65 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Rental, hiring and real estate services, division L

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy of output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.66 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Professional, scientific and technical services, division M

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy of output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.67 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Administrative and support services, division N

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy of output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.68 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Public administration and safety, division O

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the input indicator method.<br><br>Quarterly Business Indicators Survey sales data are not appropriate for measuring gross value added for division O because of the large proportion of non-market activity in this division. Growth in aggregate hours worked in division O, captured by the Labour Force Survey (LFS), is the main data source.<br><br>Defence is out of scope of the LFS so additional hours worked estimates for Defence are added to the LFS estimates to obtain total hours worked. |

Table 9.69 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Education and training, division P

| Item | Comment |
|---|---|
| **Gross value added** | No appropriate quarterly indicator currently exists. Quarterly growth is estimated via linear trend interpolation of the annual estimates. Measuring quarterly volume growth rates of Education gross value added is currently the subject of a research project. |

Table 9.70 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Health care and social assistance, division Q

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>Private sector activity is expenditure by households on private health services, excluding pharmaceuticals, sourced from the household final consumption expenditure dataset, re-expressed as a volume index. Public sector activity is captured through data received from Medicare Australia, which reflects health services classified by broad type of service. The number of the various services provided are weighted together to produce a total volume index.<br><br>Public and private outputs are expressed as volume indexes because the units of measurement in the original source data are not consistent. The public sector data are derived from numbers of services performed whereas the private sector data uses dollar values of household expenditures as the starting point.<br><br>These resulting volume indexes are re-weighted (approximately two-thirds public, one-third private) to derive a weighted volume index for the industry. This is then chained to create output in chain volume terms for the whole industry. |

Table 9.71 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Arts and recreation services, division R

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>Private sector activity is measured via sales recorded in the Quarterly Business Indicators Survey, in current and constant prices. Annual current price estimates for public sector expenditure on recreation and culture are obtained from Government Finance Statistics and re-valued by the implicit price deflator for non-defence government final consumption expenditure. Quarterly estimates are obtained by linear trend interpolation of the annual estimates. An adjustment was made for the one-off impact of the Sydney Olympic Games in 2000.<br><br>Current and constant price estimates for the public and private sectors and for the Sydney Olympic Games are summed to form total current and constant price values for this division. These are then chained, with the resulting chain volume being the indicator for the whole industry. |

Table 9.72 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Other services, division S

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>This involves extrapolating the quarterly series by taking a chain volume measure of sales growth from the Quarterly Business Indicator Survey, and applying the same level of growth to industry gross value added. This assumes that sales growth is a reliable proxy of output growth, and that growth in output and intermediate consumption occur at identical rates. |

Table 9.73 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY— Ownership of Dwellings

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>The chain volume of the 'Rent and other dwelling services' component of household final consumption expenditure is the output indicator for Ownership of dwellings. |

Table 9.74 QUARTERLY CHAIN VOLUME MEASURES OF TAXES LESS SUBSIDIES ON PRODUCTS

| Item | Comment |
|---|---|
| **Gross value added** | Quarterly volume measures are derived by the output indicator method.<br><br>A range of individual taxes and subsidies on products is used to extrapolate supply and use benchmarks for taxes on products and subsidies on products. Taxes include the Goods and Services Tax (GST), gambling taxes, insurance taxes, excises on petroleum, import duties and tobacco and alcohol taxes. Subsidies include those payable under the Fuel Tax Credits scheme, as well as subsidies payable to bus, tram and rail operators.<br><br>Current price estimates are sourced from the annual Government Finance Statistics dataset and are smoothed evenly across the four quarters of the year to which they relate. Constant price estimates are obtained from the quarterly household final consumption expenditure |

| | |
|---|---|
| | dataset, with the exception of import duties, which are sourced from the International Trade in Goods and Services dataset. When calculating GST in constant prices, consumption categories which are exempt from GST (e.g. raw food) are excluded from the calculation. GST relating to the purchase of dwellings is included.<br><br>Each individual type of tax and subsidy is quantity re-valued. The constant price measures for each tax and subsidy are aggregated allowing the creation of separate chain volume measures of taxes and subsidies. The constant price value for net taxes is derived by subtracting the constant price measure of subsidies from the constant price measure of taxes, and the result is chained to create the chained volume indicator series. |

9.102 Backcast quarterly gross value added chain volume estimates prior to the period covered by annual S-U benchmarks (i.e. June quarter 1994 and earlier) on an ANZSIC06 basis are compiled by backcasting growth from the most applicable series under the previous ANZSIC93 industry classification.

# CHAPTER 10 GROSS DOMESTIC PRODUCT - EXPENDITURE APPROACH (GDP(E))

## COMPONENTS OF GDP(E)

10.1 GDP can be derived as the sum of all final expenditures, changes in inventories of finished goods, work-in-progress and raw materials, and the value of exports of goods and services less the value of imports of goods and services. In this context, final expenditures comprise final consumption expenditure and gross fixed capital formation. These expenditures are equivalent to final demand and the measure is commonly referred to as GDP(E).

| | | |
|---|---|---|
| ***GDP(E)*** | **=** | ***Final consumption expenditure*** |
| | **+** | ***Gross fixed capital formation*** |
| | **+** | ***Changes in inventories*** |
| | **+** | ***Net acquisitions of valuables[(a)]*** |
| | **+** | ***Exports*** |
| | **-** | ***Imports*** |

***(a) net acquisitions of valuables are not separately identified in the ASNA***

### Final Consumption Expenditure

10.2 Final consumption expenditure is expenditure on goods and services that are used for the direct satisfaction of individual or collective needs or wants. It excludes expenditure on fixed assets (including dwellings), valuables and other non-financial assets. In the ASNA it is defined as:

- the total value of all expenditures on individual and collective consumption goods and services incurred by resident households, resident non-profit institutions serving households (NPISHs) and general government units.

10.3 The main expenditure aggregates are:

- *Household final consumption expenditure* - consists of the expenditure, including imputed expenditure, incurred by households on individual consumption goods and services, including those sold at prices that are not economically significant;
- *Final consumption expenditure of NPISHs* - consists of expenditure, including imputed expenditure, incurred by resident NPISHs on individual and collective consumption goods and services (however, as NPISHs are not yet treated as a separate sector in the ASNA, their final consumption expenditure is included with that of households in household final consumption expenditure in the ASNA); and
- *Government final consumption expenditure* - consists of expenditure, including imputed expenditure, incurred by general government on both individual consumption goods and services and collective consumption services. This expenditure may be divided into:
    - government expenditure on individual consumption goods and services; and
    - government expenditure on collective consumption services.

10.4 The distinction between collective and individual consumption expenditure is of considerable importance in the SNA. Consumption expenditures by general government and NPISHs on behalf of households (their individual consumption expenditures) are undertaken for the purpose of making social transfers in kind. They cover the non-market output of both general government and NPISHs, which is delivered to households free or at prices that are not economically significant, as well as goods and services bought from market producers and provided to households free or at prices that are not economically significant. Social transfers in kind are recorded differently from other transfers in kind.

Individual goods or services

10.5 Individual goods and services are essentially 'private', as distinct from 'public' goods and services. They have the following characteristics:

- it must be possible to observe and record the acquisition of the good or service by an individual household or member thereof and also the time at which it took place;
- the household must have agreed to the provision of the good or service and taken whatever action is necessary to make it possible - for example, by attending a school or clinic; and
- the good or service must be such that its acquisition by one household or person, or possibly by a small, restricted group of persons, precludes its acquisition by other households or persons.

10.6 The reference to a small, restricted group of persons is needed because certain services are provided to small groups of people simultaneously; for example, several persons may travel in the same bus, train, ship or plane or attend the same class, lecture, concert or live theatre performance. However, these are still essentially individual services if there is a restriction on the number of individuals who can consume them. Other members of the community are excluded and derive no benefit from them.

10.7 From a welfare point of view, the important characteristic of an individual good or service is that its acquisition by one household, person or group of persons brings no (or very little) benefit to the rest of the community. While the provision of certain individual health or education services (for example, vaccination or immunisation) may bring some external benefits to the rest of the community, in general the individuals concerned derive the main benefit. Thus, when a government unit incurs expenditures on the provision of individual goods or services, it must decide not only how much to spend in total but how to allocate, or distribute, the goods or services among individual members of the community. From the point of view of economic and social policy, the way in which they are distributed may be as important as the total amount spent.

Collective services

10.8 Most goods can be privately owned and are individual in the sense used here. On the other hand, certain kinds of services can be provided collectively to the community as a whole. The characteristics of these collective services may be summarised as follows:

- collective services are delivered simultaneously to every member of the community or of particular sections of the community, such as those in a particular region of a locality (but not small, restricted groups);
- the use of such services is usually passive and does not require the explicit agreement or active participation of all the individuals concerned; and
- the provision of a collective service to one individual does not reduce the amount available to others in the same community or section of the community. There is no rivalry in acquisition.

10.9 The collective services provided by government consist mostly of the provision of security and defence, the maintenance of law and order, legislation and regulation, the maintenance of public health, the protection of the environment, research and development, etc. All members of the community can benefit from such services. As the individual use of collective services cannot be recorded, individuals cannot be charged according to their use or the benefits they derive. There is no market to allocate collective services, and these services must be financed collectively - e.g. out of taxation or other government revenues.

The borderline between individual and collective services

10.10 Expenditures incurred by governments at a national level in connection with individual services such as health and education are treated as collective when they are concerned with the formulation and administration of government policy, the setting and enforcement of public standards, the regulation, licensing or supervision of producers, etc. For example, the expenditures incurred by Departments of Health or Education at a national level are included in collective consumption expenditures as they are concerned with general matters of policy, standards and regulation. On the other hand, any overhead expenses connected with the administration or functioning of a group of hospitals, schools, colleges or similar institutions are included in individual expenditures. For example, if a group of private hospitals has a central unit which provides certain common services such as purchasing, laboratories, ambulances, or other facilities, the costs of these common services would be taken into account in the prices charged to patients. The same principle is followed when the hospitals are non-market producers: all the costs which are associated with the provision of services to particular individuals, including those of any central units providing common services, are to be included in the value of expenditures on individual services.

Non-market services to enterprises

10.11 Many government expenditures benefit enterprises as much as households; examples are expenditures on the cleaning, maintenance and repair of public roads, bridges, tunnels, etc. including the provision of street lighting. These are individual services for which consumption can be monitored, and for this reason they are frequently provided on a market basis by charging tolls on road usage. However, it would be difficult to separate the services provided free to households from those provided free to enterprises and, by convention, all these expenditures are treated as collective final expenditure.

10.12 Enterprises also benefit from a number of genuinely collective services such as the provision of security by the police, fire services, etc. The use of such collective services by individual enterprises cannot be recorded, so that expenditures on such services have to be treated as government final consumption expenditure.

## Household final consumption expenditure

### *Concept*

10.13 In the ASNA, household final consumption expenditure (HFCE) consists of expenditure by resident households on goods and services, whether the expenditure is made within the domestic territory or by Australian residents abroad, and expenditure by NPISHs.

10.14 Specific transactions in household final consumption expenditure include:

- the value of income received in kind by employees which is treated as simultaneously spent by the employees on final consumption expenditure;
- the value of goods produced by households for their own consumption, such as agricultural goods produced and consumed on the same farm, and 'backyard' production;
- FISIM, the service charge component of households' interest payments and receipts (however, FISIM attributed to unincorporated enterprises owned by households is classified as intermediate consumption of the unincorporated business);
- the service charge component of premiums paid for insurance and pension fund services; and
- the imputed value of the services of owner-occupied dwellings. The imputation of rent to owner-occupied dwellings enables the services provided by dwellings to their owner-occupiers to be treated consistently with the marketed services provided by rented dwellings to their tenants. This treatment is considered necessary because, if a large number of rented houses were sold to their occupiers and if estimates of imputed rent were not calculated for owner-occupied dwellings, there would be an apparent decrease in gross domestic product without any decrease in the provision of housing services. In effect, owner-occupiers (like other owners of dwellings) are regarded as operating businesses; they receive rents (from themselves as consumers), pay expenses, and make a net contribution to the value of production which accrues to them as owners.

10.15 Any expenditure undertaken for business purposes by unincorporated enterprises (which are part of the household sector) is treated as intermediate consumption expenditure of the unincorporated enterprise, and not part of household final consumption expenditure.

10.16 Expenditures on the purchase of dwellings are explicitly excluded from household final consumption expenditure because dwellings are goods used by owners to produce housing services for those owners. Purchases of dwellings therefore constitute gross fixed capital formation. Similarly, valuables are excluded from household final consumption expenditure because they are not used up in consumption or production, nor do they deteriorate over time. Valuables are a store of value and they are classified as part of gross capital formation.

10.17 Expenditures on licences to use or own vehicles, boats and aircraft, and fees for shooting, fishing and hunting permits are also excluded. These are treated as taxes rather than as payments for services. All other kinds of licences, permits, certificates, passports etc., are treated as purchases of services and included in household final consumption expenditure.

10.18 HFCE is a large aggregate covering a wide range of goods and services. It is therefore desirable to further dissect this item. The 2008 SNA (and 1993 SNA) proposes a 'functional' classification to identify the 'functions' - in the sense of 'purposes' or 'objectives' - for which households engage in these transactions. The Classification of Individual Consumption by Purpose (COICOP) is used to classify HFCE by purpose or function. The outlays covered include:

- expenditure on consumer durables such as cars, furniture and high-value, long-lasting household appliances (but excluding dwellings, which are regarded as the fixed assets of an 'industry');
- consumer semi-durables such as clothing and footwear, other appliances, and crockery and cutlery;
- single-use goods such as food, cigarettes and tobacco, and alcoholic drinks; and
- services of all kinds such as hairdressing, dry cleaning and public transport.

10.19 COICOP provides for HFCE to be classified into the following major categories:

01 Food and non-alcoholic beverages
02 Alcoholic beverages, tobacco and narcotics
03 Clothing and footwear
04 Housing, water, electricity, gas and other fuels
05 Furnishings, household equipment and routine maintenance of the house
06 Health
07 Transport
08 Communications
09 Recreation and culture
10 Education
11 Hotels, cafes and restaurants
12 Miscellaneous goods and services

10.20 Most of these major categories are further split into subcategories.

10.21 In the ASNA the classification of HFCE is aligned, as far as possible, with COICOP. However, there are some instances where it is not yet possible for Australia to follow COICOP's recommendations. For example:

- ASNA does not include an estimate of HFCE on narcotics in COICOP division 02 Alcoholic beverages, tobacco and narcotics, as reliable data on narcotics expenditure are not available.
- Expenditure on COICOP group 09.6 (Package holidays) is not specifically identified in Australia's HFCE, but the components of package holidays (airfares, accommodation and food) are included in the corresponding major categories of HFCE.
- ASNA does not include an explicit estimate of HFCE on prostitution services in COICOP group 12.1 (Personal care) as reliable data on such expenditure are not available.

10.22 The COICOP category for Maintenance and repair of the dwelling (Group 04.3) includes minor maintenance and repair of dwellings (e.g. interior decoration and repair to fittings which are commonly carried out by both tenants and owners) but excludes maintenance and repair which is major, such as replastering walls or repairing roofs, which are typically carried out by owners only. Such a distinction is consistent with 2008 SNA paragraphs 9.66 and 9.67. The ASNA deviates from the 2008 SNA recommendation and has excluded all maintenance and repair of dwellings from HFCE. Expenses associated with these activities are included as intermediate consumption of the Ownership of Dwellings industry and COICOP Group 04.3 is not included in HFCE in the ASNA.

10.23 The final consumption expenditure of NPISHs is included with that of households in the ASNA. 2008 SNA recommends that the final consumption of NPISHs should be classified according to the Classification of the Purposes of Non-Profit Institutions Serving Households (COPNI). The major divisions of COPNI are as follows:

| | |
|---|---|
| 01 | Housing |
| 02 | Health |
| 03 | Recreation and culture |
| 04 | Education |
| 05 | Social protection |
| 06 | Religion |
| 07 | Political parties, labour and professional organisations |
| 08 | Environmental protection |
| 09 | Services n.e.c. |

10.24 Consequently, in the ASNA, the final consumption expenditure of NPISHs is classified, as far as possible, to the corresponding category of HFCE. Specifically, expenditure by NPISHs on Health, Recreation and culture, and Education are classified to the corresponding categories of HFCE, while final consumption expenditure for the other divisions is classified to Other goods and services in HFCE. As data sources for estimating the final consumption expenditure of NPISHs are very limited, indirect means are generally employed to compile these estimates. It is often necessary to assume that the final consumption expenditure for NPISHs can be estimated as the sum of income transferred by households, corporations and general government in a period, less an allowance for net property income payments and capital formation.

*Adjustments made to HFCE*

10.25 The following outlines the adjustments that are made to some or all HFCE categories.

Net expenditure overseas

10.26 This item is included in HFCE COICOP categories 01-12 (excluding 04 Housing, water, electricity, gas and other fuels) as an adjustment so that total HFCE reflects the expenditure of resident households (in Australia and overseas) only. Expenditures by overseas visitors on fares, meals, accommodation, entertainment, recreation and other goods and services in Australia are deducted from the appropriate HFCE categories while expenditures by Australian residents abroad are added.

10.27 HFCE net expenditure overseas (NEO) is derived using Services Debits and Credits data obtained from *Balance of Payments and International Investments Position, Australia* (cat. no. 5302.0), tables 15 and 16.

10.28 Calculation of NEO is a two-stage process. The first stage estimates the total value of NEO while the second allocates expenditure to the appropriate HFCE category. The total value of NEO is calculated by offsetting two items against each other; namely, the expenditure of Australian residents abroad (debits) and the expenditure of non-residents in Australia (credits).

10.29 It should be noted that NEO does not include online purchases by Australian households from international websites. These are encompassed in the annual HFCE benchmarks, chiefly through alignment with data obtained from the Household Expenditure Survey (HES).

10.30 The expenditure of residents overseas is calculated as the sum of two items:

- Personal travel debits; and
- Expenditure of Australian Government employees.

10.31 Personal travel debits, as adjusted for national accounting purposes, record the acquisition of goods and services abroad by residents travelling at their own expense, including students. Business travellers are not included as their expenditure is largely intermediate consumption of the employing business. Examples are purchases of accommodation, meals, ground transportation and tours.

10.32 The estimate for personal travel debits is calculated as the sum of two original current price Balance of Payments series: Services Debits - Travel - Personal - Education-related and Services Debits - Travel - Personal - Other services. State/Territory splits are derived using proportions from the ABS publication *Overseas Arrivals and Departures, Australia* (cat. no. 3401.0).

10.33 Expenditure of Australian Government employees records the personal expenditure on goods and services by Australian diplomats and their dependants stationed abroad. It is also based on an original current price Balance of Payments series: an unpublished lower level component of Services Debits – Government goods and services n.i.e. State/Territory estimates are derived using figures on the number of Australian government employees abroad.

10.34 The expenditure of non-residents in Australia is derived by aggregating three items:

- Business travel credits;
- Personal travel credits; and
- Expenditure of foreign government employees.

10.35 Business travel credits cover expenditures on goods and services by seasonal and non-resident workers employed in Australia, and by travellers who visit, for business purposes, on behalf of an enterprise resident in another economy. The Balance of Payments series for Business travel credits is Services Credits – Travel – Business. State/Territory splits are derived using proportions from the ABS publication *Overseas Arrivals and Departures, Australia* (cat. no. 3401.0).

10.36 Personal travel credits record expenditures on goods and services in Australia by non-residents travelling at their own expense, for purposes other than business. The estimate for personal travel credits is calculated as the sum of two original current price Balance of Payments series: Services Credits – Travel – Personal – Education-related and Services Credits – Travel – Personal – Other services. State and Territory estimates are again calculated using proportions from *Overseas Arrivals and Departures, Australia* (cat. no. 3401.0).

10.37 Expenditure of foreign government employees records the personal expenditure in Australia on goods and services by foreign diplomats and their dependants stationed in Australia. It is based on the unpublished lower level component of the Balance of Payments series Services Credits – Government goods and services n.i.e. State/Territory estimates of the expenditure of foreign government employees in Australia are derived using information on the number of foreign diplomats.

10.38 Total NEO is calculated by subtracting the expenditure of non-residents in Australia from the expenditure of Australia residents overseas. This is then allocated to various categories of HFCE using information from the International Visitor Survey, published by Tourism Research Australia. Data on expenditure from this survey is used to derive weights for the HFCE categories, which are then applied to the total NEO estimate.

10.39 Quarterly and annual estimates of total NEO in current price terms are published as a memorandum item in *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) and *Australian System of National Accounts* (cat. no. 5204.0).

Tourist Refund Scheme

10.40 An adjustment is made to applicable HFCE categories for the Tourist Refund Scheme (TRS), whereby individuals are able to claim back, under certain conditions, the goods and services tax (GST) and wine equalisation tax (WET) on goods purchased in Australia.

10.41 Information regarding the value of refunds from this scheme, broken down by type of good, is obtained quarterly from the Australian Customs and Border Protection Service. These data are then allocated to the appropriate HFCE categories.

10.42 Adjustments for the TRS are made to the following COICOP categories:

- 2.1 Alcoholic beverages;
- 03 Clothing and footwear;
- 05 Furnishings and household equipment;
- 09 Recreation and culture; and
- 12 Miscellaneous goods and services.

Underground economy

10.43 This adjustment attempts to capture the understatement in HFCE due to activities occurring in the underground economy. *Measuring the Non-Observed Economy: A Handbook*, a publication jointly authored by the OECD, the IMF, the International Labour Organization (ILO) and the Interstate Statistical Committee of the Commonwealth of Independent States, defined the underground economy as covering "those activities that are productive and legal but are deliberately concealed from the public authorities to avoid payment of taxes or complying with regulations".

10.44 In HFCE, the understatement is most likely to result from businesses under-reporting retail turnover in the source data used for the compilation of household expenditure estimates.

10.45 Annual estimates of home production are incorporated into S-U benchmarks. The annual value of self-supplied food is based on estimates of the amount of food produced for home consumption from the ABS publication *Home Production of Selected Foodstuffs, Australia* (cat. no. 7110.0). The value of homemade alcohol is based on estimates of the amount of alcohol produced for home consumption from the ABS publication *Home Production of Selected Foodstuffs, Australia* (cat. no. 7110.0).

10.46 Estimates for the underground activity occurring in the various HFCE categories are calculated as proportions of the expenditure estimates. The factors used have been compiled based on analysis by the ABS. These are not varied from year-to-year, but are subject to periodic review. For more information, refer to the October 2003 issue of *Australian Economic Indicators* (cat. no. 1350.0), which includes a feature article on the underground economy.

10.47 In ASNA, adjustments for the underground economy are made to the following COICOP categories:

- 01.1 Food;
- 03 Clothing and footwear;
- 05 Furnishings, household equipment and routine household maintenance;
- 07 Transport;
- 09 Recreation and culture;
- 11 Restaurants and hotels; and
- 12 Miscellaneous goods and services.

Repair and Maintenance

10.48 This adjustment represents the expenditure by households on the repair and maintenance of various HFCE products, other than those captured in the Repair and maintenance not identified elsewhere component of HFCE Other Services (COICOP group 12.5).

10.49 The sources used to derive estimates of household expenditure such as retail sales do not include spending on repairs and maintenance, therefore making it necessary to adjust for this expenditure separately.

10.50 Data on the total repair and maintenance expenditure by households is benchmarked irregularly to the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0). Quarterly estimates are obtained by interpolating and extrapolating these benchmarks. Total repair and maintenance expenditure is broken down into HFCE product categories by applying weights, also obtained from the Household Expenditure Survey.

10.51 Adjustments for repairs and maintenance expenditure are applied to the following COICOP categories:

- 03 Clothing and footwear;
- 05 Furnishings, household equipment and routine household maintenance;
- 09 Recreation and culture; and
- 12 Miscellaneous goods and services.

Benchmark years

10.52 Final consumption expenditure by resident households is calculated as:

*Final consumption expenditure in the domestic market*
\+ *Expenditure overseas by Australian residents*
\- *Expenditure in Australian by foreign residents*
= *Household final consumption expenditure*

10.53 When the annual compilation method is the sum of the quarters then reconciliation to the annual value is not necessary. When the quarterly series is estimated using an indicator then reconciliation to the annual value is required.

10.54 When the method for quarterly chain volume series is derived as extrapolation by a quarterly indicator the quarterly series is extrapolated from the latest annual estimate available. As each new annual value becomes available, the quarterly estimates are obtained by interpolating between the latest annual values using the quarterly indicator.

10.55 Unlike the quarterly production approach series, which draws most of its annual benchmarks from the balanced industry accounts, there are additional benchmarks for household final consumption expenditure. These include the ABS Economic Activity Survey and the Retail Trade Survey. The information on commodity expenditure from these sources is used to confront the industry production data. All benchmarks are therefore subject to revision. All quarterly current price estimates are reconciled to annual values based on the S-U confrontation. In cases where data are not available for every year, interpolation techniques are used for the intervening time span. Suitable indicators are used to obtain annual estimates for the span of the non-benchmark years. Once produced, these estimates are used in the supply and use framework to allow data confrontation.

10.56 A large proportion of household final consumption expenditure (HFCE) comprises sales by retail stores. Benchmarks are a combination of point of sale commodity data from the Retail and Wholesale Activity Survey (and the Retail Industry Survey and Wholesale Industry Survey conducted every 7 years) plus purchasing information from the Household Expenditure Survey which is held each 5 to 6 years. Latest data from these surveys are released in the publications: *Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0), *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0) and *Household Expenditure Survey, Australia: Detailed Expenditure Items* (cat. no.6535.0.55.001). These surveys contain a product dimension which is classified to COICOP, for HFCE, with annual values being calculated via linear interpolation. For provisional years (that is, not yet balanced within the supply and use framework) and for the quarterly indicator series which are reconciled to these annual values, estimates are derived using movements in sales by outlet type from the Retail Trade Survey. This method is used for all commodities purchased from retail trade outlets except for motor vehicles and tobacco products where alternative information is available. For alcohol, the method is used for purchases from retail outlets and the Quarterly Business Indicator Survey (QBIS) is used for the portion purchased from non-retail outlets such as hotels, clubs and taverns. Quarterly chain volume series are derived by price deflation of commodities using sub-indexes of the consumers price index and Retail Trade Survey outlet type deflators.

10.57 Retail expenditure estimates by consumption product are derived from retail trade data, which does not distinguish between resident and non-resident sales. Subsequently, estimates are made for expenditure by non-resident households in Australian (as these are recorded as exports) and alternatively expenditure by resident household's overseas (imports). This ensures no double counting.

10.58 The tables below outline the data sources and methods used in the estimation of annual household final consumption expenditure by COICOP category. They include both the current price estimates and volume estimates.

Table 10.1 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Food and non-alcoholic beverages

| Item | Comment |
|---|---|
| **Current price estimates** | The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmark estimates for this series.<br><br>The value of self-supplied food is included and is based on estimates of the amount of food produced for home consumption from the ABS publication *Home Production of Selected Foodstuffs, Australia* (cat. no. 7110.0).<br><br>The following outlines adjustments that are made:<br>• sales of food prepared off premises sourced from the ABS irregular publications *Accommodation Services, Australia* (cat. no. 8695.0), *Clubs, Pubs, Taverns and Bars, Australia* (cat. no. 8687.0), *Cafes, Restaurants and Catering Services, Australia* (cat. no. 8655.0), *Casinos, Australia* (cat. no. 8683.0), *Gambling Services, Australia* (cat. no. 8684.0), *Performing Arts, Australia* (cat. no. 8697.0) and *Sports and Physical Recreation Services, Australia* (cat. no. 8686.0).<br>• sales that are out of scope of the RISWIS survey, which are:<br>  • manufacturing units which sell directly to households,<br>  • goods purchased on ships and aircraft, flea market sales and sales by NPISH units,<br>• an estimate for cooked meals by food stores prepared on the premises for consumption off the premises is subtracted,<br>• an estimate for food withdrawn from sale is also removed (this is considered to be an intermediate use of food), and<br>• net expenditure overseas.<br><br>For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.<br><br>When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.<br><br>The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Current price estimates for purchases of food by Australian residents are re-valued using relevant price deflator from the Consumer Price Index. |

Table 10.2 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Alcoholic beverages

| Item | Comment |
|---|---|
| **Current price estimates** | The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.<br><br>The value of home-made alcohol is included and is based on estimates of the amount of alcohol produced for home consumption from the ABS publication *Home Production of Selected Foodstuffs, Australia* (cat. no. 7110.0).<br><br>The following outlines adjustments that are made:<br>• sales of alcoholic beverages from service industries sourced from the ABS irregular publications *Accommodation Services, Australia* (cat. no. 8695.0), *Clubs, Pubs, Taverns and Bars, Australia* (cat. no. 8687.0), *Cafes, Restaurants and Catering Services, Australia* (cat. no. 8655.0), *Casinos, Australia* (cat. no. 8683.0), *Gambling Services, Australia* (cat. no. 8684.0), *Performing Arts, Australia* (cat. no. 8697.0) and *Sports and Physical Recreation Services, Australia* (cat. no. 8686.0).<br>• sales that are out of scope of the RISWIS survey, which are:<br>  • manufacturing units which sell directly to households, and<br>  • goods purchased on ships and aircraft, and<br>• net expenditure overseas.<br><br>For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.<br><br>When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.<br><br>The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Volume estimates for alcoholic beverages are based on the sum of the quarterly volumes. |

Table 10.3 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Cigarettes and Tobacco

| Item | Comment |
|---|---|
| **Current price estimates** | The value of tobacco products consumed by households is estimated using the formula:<br>Domestic production<br>+ imports<br>- exports<br>- re-exports<br>+ taxes on products<br>+ margin estimate<br>= Total consumption.<br><br>The value of domestic production is estimated using the estimates of income for sale of goods from the Economic Activity Survey. Exports and re-exports data are obtained from trade data as sourced from the ABS Balance of Payments. Taxes on products are sourced from Government Finance Statistics. Margins data are obtained from the RISWIS.<br><br>The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Volume estimates for cigarettes and tobacco are based on the sum of the quarterly volumes. |

Table 10.4 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Clothing and footwear

| Item | Comment |
|---|---|
| **Current price estimates** | The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.<br><br>The following outlines adjustments that are made:<br>• sales that are out of scope of the RISWIS survey, which are:<br>  • manufacturing units which sell directly to households, and<br>  • flea market sales, and<br>• net expenditure overseas.<br><br>For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.<br><br>When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.<br><br>The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The |

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| | IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Current price estimates for purchases of clothing and footwear by Australian residents are re-valued using the relevant price deflator from the CPI. |

Table 10.5 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Housing, water, electricity, gas and other fuels

| Item | Comment |
|---|---|
| **Imputed rentals for housing** | |
| **Current price estimates** | The Census of Population and Housing is the benchmark data source for the number of owner-occupied and rented dwellings and information about rents paid for rented dwellings.<br><br>The imputed rent for owner-occupied dwellings is calculated by multiplying average rents (adjusted to exclude rents at less than market value) reported in the census for privately rented dwellings in various categories.<br><br>Estimates of imputed rent of owner occupiers for intercensal and post-census periods are obtained by multiplying an estimate of the stock of dwellings by an estimate of the average rent of rented dwellings.<br><br>The stock of dwellings is estimated by extrapolating the benchmark estimate. The benchmark stock of dwellings includes all occupied private dwellings and a proportion of unoccupied private dwellings, but excludes short-term caravans in caravan parks.<br><br>Private dwellings include separate houses, duplexes, town houses, flats including those which are part of a building that is used for commercial purposes (e.g. a retail shop) and caravans used for long-term accommodation. Additions to the stock are calculated from the number of dwelling completions sourced from the ABS publication *Building Activity, Australia* (cat. no. 8752.0). This is then modified by a factor to take into account other changes to the stock of dwellings (demolitions, net conversions from commercial uses and dwelling completions not in the scope of the survey).<br><br>For intercensal periods, this factor is calculated by dividing the change in the stock between the census benchmarks by the total number of dwelling completions in the period. For the post-census period, the factor is assumed to be the same as for the latest intercensal period.<br><br>After the latest applied benchmarks from the Census of Population and Housing, the total and owner occupied rent prices have been obtained from a combination of the Survey of Income and Housing (SIH), the CPI and real estate bulletins (Australian Property Monitors and Real Estate |

Institute of Australia).

**Volume estimates**

Volume estimate for imputed rentals for housing is based on the sum of the quarterly volumes compiled using a net capital stock series which represents the volume of services provided by imputed rent on private dwellings.

**Actual rentals for housing**

**Current price estimates**

These estimates are produced using the same sources as for the estimates of imputed rentals for housing.

The benchmark calculation gives a direct measure of the dwelling rent paid by households to the owners of dwellings.

**Volume estimates**

Volume estimate for actual rentals for housing is based on the sum of the quarterly volumes compiled using a net capital stock series which represents the number of private dwellings.

**Other services related to the dwelling**

**Current price estimates**

Data from the periodic *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0) (HES) provide the benchmark estimates for this series which includes water and sewerage and waste services.

The following scope and coverage adjustments are made:

- household expenses on water and sewerage service charges for rental and investment properties, which are out of scope of the HES - based on HFCE estimates of actual rent for housing and imputed rent for owner occupiers,
- adjustments to capture private and non-private dwellings, including remote areas, and
- adjustments to capture final consumption expenditure of NPISH units using waste collection and disposal services, based on current grants information sourced from the Government Finance Statistics.

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Volume estimates for water and sewerage services are based on the sum of the quarterly volumes.

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| | Annual current price estimates in relation to waste collection and disposal services are re-valued using relevant price deflators from the Consumer Price Index to derive the annual volume estimates. |
| **Electricity, gas and other fuels** | |
| **Current price estimates** | The Household Expenditure Survey provides the benchmark estimates for this series.<br><br>The following scope and coverage adjustments are made:<br><br>• adjustments to capture non-private dwellings and remote areas.<br><br>For the years where HES data are not available the annual estimate is the sum of the four quarters.<br><br>When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.<br><br>The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Current price estimates of purchases of electricity, gas and other fuels are re-valued using relevant price deflators from the Consumer Price Index. |

Table 10.6 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Furnishings and household equipment

| Item | Comment |
|---|---|
| **Furniture and furnishings, carpets and other floor coverings** | |
| **Current price estimates** | The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.<br><br>The following outlines adjustments that are made:<br>• sales that are out of scope of the RISWIS survey, which are:<br>  • manufacturing units which sell directly to households,<br>  • dealers' margins associated with second-hand goods, and<br>  • sales made by NPISH units and flea markets, and<br>• net expenditure overseas.<br><br>For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.<br><br>When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit |

the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price estimates of purchases of furnishings and floor coverings in Australia are re-valued using relevant price deflators from the Consumer Price Index.

**Household textiles**
**Current price estimates**

The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- sales that are out of scope of the RISWIS survey, which are:
  - sales made by NPISH units and flea markets, and
- net expenditure overseas.

For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.

When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price estimates of purchases of household textiles in Australia are re-valued using relevant price deflators from the Consumer Price Index.

**Household appliances**
**Current price estimates**

The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- sales that are out of scope of the RISWIS survey, which are:
  - manufacturing and wholesaling units which sell directly to households,
  - electricity, gas and water industry units which sell directly to households,
  - dealers' margins associated with second-hand goods, and
  - sales made by NPISH units and flea markets, and
- net expenditure overseas.

For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.

When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price estimates of purchases of household appliances in Australia are re-valued using relevant price deflators from the Consumer Price Index.

**Glassware, tableware and household utensils**

**Current price estimates**

The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- sales that are out of scope of the RISWIS survey, which are:
  - sales made at flea markets, and
- net expenditure overseas.

For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.

When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the

product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price estimates of purchases of glassware, tableware and household utensils in Australia are re-valued using relevant price deflators from the Consumer Price Index.

**Tools and equipment for house and garden**

**Current price estimates**

The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- sales that are out of scope of the RISWIS survey, which are:
  - sales made at flea markets, and
- net expenditure overseas.

For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.

When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price estimates of purchases of tools and equipment for house and garden in Australia are re-valued using relevant price deflators from the Consumer Price Index.

**Non-durable household goods**

**Current price estimates**

The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- sales that are out of scope of the RISWIS survey, which are:
  - manufacturing and wholesaling units which sell directly to households, and
  - sales made at flea markets, and
- net expenditure overseas.

For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.

When the next RISWIS benchmark becomes available a linear

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| | interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.<br><br>The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Current price estimates of purchases of non-durable household goods in Australia are re-valued using relevant price deflators from the Consumer Price Index. |

Table 10.7 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Health

| Item | Comment |
|---|---|
| **Medicines, medical aids and therapeutic appliances** | |
| **Current price estimates** | The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.<br><br>The following adjustment is made:<br>• net expenditure overseas.<br><br>For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.<br><br>When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.<br><br>The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Volume estimates for the series are based on the sum of the quarterly volumes. |

**Ambulatory health care**

**Current price estimates**

The Household Expenditure Survey provides the primary benchmarks for this series.

The following scope and coverage adjustments are made:

- to cover remote and non-private dwellings which are not in scope of the HES,
- to capture current grants from government to NPISH units providing ambulatory health care sourced from annual time series data from the Government Finance Statistics,
- to capture current grants and donations from corporations and households to NPISH units providing ambulatory health care as extrapolated from the ABS publication *Australian National Accounts: Non-Profit Institutions Satellite Account* (cat. no. 5256.0),
- household claims from private health insurance funds sourced from the Private Health Insurance Administration Council (PHIAC),
- an estimate of 15% of household claims associated with the health service component of workers' compensation and motor vehicle and third party insurance sourced from the Australian Prudential Regulation Authority (APRA). This estimate was derived from workers' compensation and other insurance estimates associated with health services for ANZSIC subdivision 85 *Medical and other health care services* published in ABS publication *Health Care Services* (cat. no. 8570.0), and
- net expenditure overseas.

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Volume estimates for ambulatory health care are based on the sum of the quarterly volumes.

**Hospital, ambulance services and nursing home care**

**Current price estimates**

The Household Expenditure Survey (HES) provides the primary benchmarks for this series.

The following scope and coverage adjustments are made:

- to cover remote and non-private dwellings which are not in

scope of the HES,
- to capture current grants from government to NPISH units providing ambulatory health care sourced from annual time series data from the Government Finance Statistics,
- to capture current grants and donations from corporations and households to NPISH units providing ambulatory health care as extrapolated from the ABS publication *Australian National Accounts: Non-Profit Institutions Satellite Account* (cat. no. 5256.0),
- household claims from private health insurance funds sourced from the Private Health Insurance Administration Council (PHIAC), and
- an estimate of 15% of household claims associated with the health service component of workers' compensation and motor vehicle and third party insurance sourced from the Australian Prudential Regulation Authority (APRA). This estimate was derived from workers' compensation and other insurance estimates associated with health services for ANZSIC subdivision 85 *Medical and other health care services* published in ABS publication *Health Care Services* (cat. no. 8570.0),
- an estimate of household expenses associated with nursing home fees. As nursing homes are not in scope of the HES, direct expenditure on these services is estimated using services income associated with Aged care residential services from the 2009-10 Economic Activity Survey, and
- net expenditure overseas.

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Volume estimates for hospital, ambulance services and nursing home care are based on the sum of the quarterly volumes.

Table 10.8 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Transport

| Item | Comment |
|---|---|
| **Purchase of vehicles** | |
| **Current price estimates** | The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.<br><br>The following outlines adjustments that are made:<br>• purchase of vehicles that are out of scope of the survey,<br>• dealers' margins on used vehicles traded between households,<br>• the value of private imports of used vehicles are estimated using data supplied from Customs documentation and an average price for used cars sourced from Vehicle Sales from the Federal Chamber of Automotive Industries Vehicle Facts (FCAI-VFACTs) or Glass's Automotive Business Intelligence (Glass's guide), and<br>• net expenditure overseas.<br><br>For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.<br><br>When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.<br><br>The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Volume estimates for this series are based on the sum of the quarterly volumes. |
| **Operation of personal transport equipment** | |
| **Current price estimates** | Annual household expenditure on automotive petroleum and coal products are based on the ABS publication *Survey of Motor Vehicle Use, Australia* (cat. no. 9208.0) (SMVU).<br><br>The SMVU includes information on the fuel consumption of all motor vehicles by motor vehicle type and the private use of all vehicles by type of vehicle. Using this information and the national average retail price per litre of petrol and diesel sourced from the Australian Institute of Petroleum and the Automotive Petroleum Association, respectively, annual estimates of household expenditure for automotive petroleum and coal products are estimated.<br><br>The Household Expenditure Survey provides the primary benchmarks for the series relating to pneumatic tyres and tubes for motor cars and motor cycles, motor vehicle engines, chassis and panels; transport equipment not elsewhere classified, motor vehicle repair and maintenance expenditure and miscellaneous motoring expenditure. |

The following outlines adjustments that are made:

- to cover remote and non-private dwellings,
- current grants from government to NPISH (sourced from annual Government Finance Statistics), and
- net expenditure overseas.

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Volume estimates for operation of personal transport equipment are based on the sum of the quarterly volumes.

**Transport services**

**Passenger transport by railway**

**Current price estimates**

The Household Expenditure Survey provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- to cover remote and non-private dwellings,
- to capture the final consumption expenditure of NPISH units using railway passenger transport services based on current grants information as sourced from the Government Finance Statistics,
- current grants from government to NPISH (sourced from annual Government Finance Statistics), and
- net expenditure overseas.

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Expenditures on rail fares are re-valued using relevant price deflators from the Consumer Price Index.

**Passenger transport by road**

**Current price estimates**

The Household Expenditure Survey provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- to cover remote and non-private dwellings,
- to capture the final consumption expenditure of NPISH units using road passenger transport services based on current grants information as sourced from the Government Finance Statistics,
- current grants from government to NPISH (sourced from annual Government Finance Statistics), and
- net expenditure overseas.

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price annual household expenditures on bus and taxi fares are re-valued using relevant price deflators from the Consumer Price Index.

**Passenger transport by air**

**Current price estimates**

The Household Expenditure Survey provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- to cover remote and non-private dwellings,
- current grants from government to NPISH (sourced from

annual Government Finance Statistics), and
- net expenditure overseas.

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price annual household expenditures on airfares are re-valued using relevant price deflators from the Consumer Price Index.

**Passenger transport by sea and inland water**

**Current price estimates**

The Household Expenditure Survey provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- to cover remote and non-private dwellings,
- to capture the final consumption expenditure of NPISH units using passenger transport by sea and inland waterway services based on current grants information as sourced from the Government Finance Statistics,
- current grants from government to NPISH (sourced from annual Government Finance Statistics), and
- net expenditure overseas.

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data

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| | with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Current price annual household expenditures on passenger transport by sea and inland waterway services are re-valued using relevant price deflators from the Consumer Price Index. |

Table 10.9 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Communications

| Item | Comment |
|---|---|
| **Postal services** | |
| **Current price estimates** | The Household Expenditure Survey provides the primary benchmarks for this series.<br><br>The following outlines adjustments that are made:<br><br>• to cover remote and non-private dwellings,<br>• current grants from government to NPISH (sourced from annual Government Finance Statistics), and<br>• net expenditure overseas.<br><br>For the years where HES data are not available the annual estimate is the sum of the four quarters.<br><br>When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.<br><br>The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Current price estimates of expenditure on postal services are re-valued using relevant price deflators from the CPI. |
| **Telecommunication services** | |
| **Current price estimates** | The Household Expenditure Survey provides the primary benchmarks for this series.<br><br>The following outlines adjustments that are made:<br><br>• to cover remote and non-private dwellings,<br>• to capture the final consumption expenditure of NPISH units using telecommunication services based on current grants information sourced from the Government Finance Statistics,<br>• current grants from government to NPISH (sourced from |

annual Government Finance Statistics), and
- net expenditure overseas.

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price annual estimates of expenditure on telephone and facsimile services are re-valued using relevant price deflators from the Consumer Price Index.

Volume estimates for internet services are based on the sum of the quarterly volumes.

Table 10.10 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Recreation and culture

| Item | Comment |
|---|---|
| **Audio visual, photographic and data processing equipment and accessories** | |
| **Current price estimates** | The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.<br><br>The following outlines adjustments that are made:<br>• sales of recreation and culture sourced from the ABS irregular publications *Accommodation Services, Australia* (cat. no. 8695.0), *Clubs, Pubs, Taverns and Bars, Australia* (cat. no. 8687.0), *Cafes, Restaurants and Catering Services, Australia* (cat. no. 8655.0), *Casinos, Australia* (cat. no. 8683.0), *Gambling Services, Australia* (cat. no. 8684.0), *Performing Arts, Australia* (cat. no. 8697.0) and *Sports and Physical Recreation Services, Australia* (cat. no. 8686.0).<br>• sales that are out of scope of the RISWIS survey, which are:<br>  • flea market sales and sales by NPISH units,<br>• current grants from government to NPISH (sourced from annual Government Finance Statistics),<br>• net expenditure overseas.<br><br>For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.<br><br>When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit |

the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price estimates of purchases of audio visual, photographic and data processing equipment and accessories in Australia are re-valued using relevant price deflators from the Consumer Price Index.

**Other major durables for recreation and culture**

**Current price estimates**

The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- sales that are out of scope of the RISWIS survey, which are:
  - manufacturing units that sell directly to the public,
  - a proportion of caravans used as residences is excluded,
  - dealers' margins for sales of second-hand boats and caravans, excluding transactions between households, and
  - flea market sales,
- current grants from government to NPISH (sourced from annual Government Finance Statistics),
- net expenditure overseas.

For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.

When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price estimates of purchases of other major durables for

recreation and culture are re-valued using relevant price deflators from the Consumer Price Index.

**Other recreational items and equipment**

**Current price estimates**

The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- sales that are out of scope of the RISWIS survey, which are:
  - manufacturing units that sell directly to the public,
  - sales of 'backyard' pure bred pets based on a historical value extrapolated using a growth rate for retail sales of pets and live animals over the last seven years from RISWIS,
  - sales of toys and other goods provided by NPISH units, and
  - flea market sales,
- current grants from government to NPISH (sourced from annual Government Finance Statistics),
- net expenditure overseas.

For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.

When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price annual estimates of purchases of other recreational items and equipment are re-valued using relevant price deflators from the Consumer Price Index.

**Recreational and cultural services**

**Sporting and recreational services**

**Current price estimates**

Household expenditure for sporting and recreational services not elsewhere classified is based on historical estimates which are rolled forward by multiplying movements associated with the estimated resident population and the CPI for the sports participation series.

The Household Expenditure Survey provides the primary benchmarks for this series relating to the cost of hiring entertainment equipment and facilities and sporting and educational services.

The following outlines adjustments that are made:

- to cover remote and non-private dwellings, and
- net expenditure overseas.

Current expenditure of NPISHs providing sporting and recreational services is sourced from current grants to NPISH units providing sporting and recreational services. These data are sourced from Government Finance Statistics and current grants and donations from corporations and households to NPISHs units extrapolated from the ABS publication *Australian National Accounts: Non-Profit Institutions Satellite Account* (cat. no. 5256.0).

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price estimates of purchases of expenditures on sporting and recreational services are re-valued using relevant price deflators from the Consumer Price Index.

**Cultural and entertainment services**

**Current price estimates**

The Household Expenditure Survey provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- to cover remote and non-private dwellings,
- to capture the final consumption expenditure of NPISH units providing cultural and entertainment services based on current grants information as sourced from the Government Finance Statistics and donations and sponsorship from households and corporations to NPISH units for providing these services extrapolated from the ABS publication *Australian National Accounts: Non-Profit Institutions Satellite Account* (cat. no. 5256.0), and
- net expenditure overseas.

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price estimates of expenditures on cultural and entertainment services are re-valued using relevant price deflators from the Consumer Price Index.

**Net losses from gambling**

**Current price estimates**

Current price estimates on Net losses from gambling are sourced from the *Australian Gambling Statistics* publication (published by the Queensland government). This publication provides comprehensive annual data on gambling in Australia.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Net losses from personal outlays on gambling by households are re-valued using relevant price deflators from the CPI.

**Newspapers, books and stationery**

**Current price estimates**

The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series.

The following outlines adjustments that are made:

- sales of newspapers, books and stationery sourced from the ABS irregular publications: *Accommodation Services, Australia* (cat. no. 8695.0), *Clubs, Pubs, Taverns and Bars, Australia* (cat. no. 8687.0), *Cafes, Restaurants and Catering Services, Australia* (cat. no. 8655.0), *Casinos, Australia* (cat. no. 8683.0), *Gambling Services, Australia* (cat. no. 8684.0), *Performing Arts, Australia* (cat. no. 8697.0) and *Sports and Physical Recreation Services, Australia* (cat. no. 8686.0).
- sales that are out of scope of the RISWIS survey, which are:
  - manufacturing units which sell directly to households,
  - sales of books and other goods provided by NPISH units, and
  - flea market sales,
- current grants from government to NPISH (sourced from annual Government Finance Statistics),
- net expenditure overseas.

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| | For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.<br><br>When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.<br><br>The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Annual current price estimates of household expenditures on newspapers, books and stationery are re-valued using relevant price deflators from the Consumer Price Index. |

Table 10.11 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Education services

| Item | Comment |
|---|---|
| **Current price estimates** | The Household Expenditure Survey provides the primary benchmarks for this series.<br><br>The following outlines adjustments that are made:<br>• to cover remote and non-private dwellings,<br>• to capture current grants from government to NPISH units providing education services sourced from annual time series data from Government Finance Statistics,<br>• to capture current grants and donations from corporations and households to NPISH units providing education services extrapolated from benchmark data in the ABS publication *Australian National Accounts: Non-Profit Institutions Satellite Account* (cat. no. 5256.0), and<br>• net expenditure overseas.<br><br>The household expenditure associated with the tertiary education services Higher Education Loan Program (HELP) was derived from time series data on HELP provided by the Department of Education, Employment and Workplace Relations.<br><br>For the years where HES data are not available the annual estimate is the sum of the four quarters.<br><br>When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.<br><br>The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The |

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|---|---|
| | IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Annual volume estimates for education are based on the sum of the quarterly volumes. |

Table 10.12 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Hotels, catering and restaurants

| Item | Comment |
|---|---|
| **Catering** | |
| **Current price estimates** | The Retail Industry Survey (RIS) 1998/99 provides the benchmark for this series.<br><br>The RIS results are adjusted to account for sales not covered by the RIS.<br><br>The annual estimate is the sum of the four quarters for all years since the RIS.<br><br>The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Expenditures on catering by Australian residents are re-valued using relevant price deflators from the Consumer Price Index. |
| **Accommodation services** | |
| **Current price estimates** | The Household Expenditure Survey provides the primary benchmarks for this series.<br><br>The following outlines adjustments that are made:<br>• to cover remote and non-private dwellings,<br>• to capture current grants from government to NPISH units providing accommodation services as sourced from annual time series data from Government Finance Statistics, and<br>• to capture current grants and donations from corporations and |

households to NPISH units providing accommodation services as extrapolated from the ABS publication *Australian National Accounts: Non-Profit Institutions Satellite Account* (cat. no. 5256.0), and
- net expenditure overseas.

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Expenditures on accommodation services by Australian residents are re-valued using relevant price deflators from the Consumer Price Index.

Table 10.13 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Miscellaneous goods and services

| Item | Comment |
|---|---|
| **Personal care** | |
| **Current price estimates** | The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for the series relating to personal outlays on personal care products such as perfume, cosmetics and soap.<br><br>The Household Expenditure Survey (HES) provides the benchmarks for miscellaneous services including hair dressing and beauty salon services.<br><br>The following outlines adjustments that are made:<br>• sales that are out of scope of the RISWIS survey, which are:<br>  • sales on aircraft and ships, and<br>  • flea market sales,<br>• HES-based - adjustments to cover remote and non-private dwellings,<br>• current grants from government to NPISH (sourced from annual Government Finance Statistics),<br>• net expenditure overseas.<br><br>For the years where RISWIS and HES data are not available the annual estimate is the sum of the four quarters.<br><br>When the next RISWIS and HES benchmarks become available a linear interpolation technique is used to align the current estimates to best fit the linear model between the benchmarks. |

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Expenditures on personal care by Australian residents are re-valued using relevant price deflators from the Consumer Price Index.

**Personal effects**

**Current price estimates**

The periodic Retail and Wholesale Industry Survey (RISWIS) provides the primary benchmarks for this series relating to personal outlays on jewellery and watches etc.

The following outlines adjustments that are made:

- sales that are out of scope of the RISWIS survey, which are:
  - sales on aircraft and ships, and
  - flea market sales,
- current grants from government to NPISH (sourced from annual Government Finance Statistics), and
- net expenditure overseas.

For the years where RISWIS data are not available the annual estimate is the sum of the four quarters.

When the next RISWIS benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Expenditures on personal effects by Australian residents are re-valued using relevant price deflators from the Consumer Price Index.

**Insurance**

**Description**

Included in this item is the service charge paid by householders for insurance. Premiums paid for general insurance of householders'

effects, motor vehicle insurance, health insurance, and life insurance and superannuation can be seen to comprise a service charge for insuring, a payment for the risk of insuring and, for life insurance and superannuation funds, an element of saving.

**Current price estimates**

**Homeowner and household insurance**

This is the service charge for insuring householders' furniture and effects, generally called home contents insurance. Insurance of the dwelling itself is excluded from household final consumption expenditure as it is considered to be part of the intermediate consumption of the industry Ownership of dwellings.

Premiums and claims for Homeowner and Household Insurance are obtained from *Quarterly General Insurance Performance Statistics; General Insurance Supplementary Statistical Tables; Half Yearly General Insurance Bulletin* and *Selected Statistics on the General Insurance Industry*, published by the Australian Prudential Regulatory Authority (APRA) in quarterly, half-yearly and annual bulletins.

Expected claims are derived by using a centred five year moving average of claims incurred.

Premium supplements are calculated using the proportion of Homeowner and Household premiums to total general insurance premiums multiplied by total investments earnings on general insurance technical reserves.

Premium supplements are added together with personal premiums to give the total value of premiums.

Personal premiums paid plus premium supplements less expected personal claims incurred gives the value of the service charge which is included in household final consumption expenditure.

Taxes on products are added to derive a purchases price value. Taxes on products are allocated to this product using a number of methods. These include the proportion of GST from net of premiums less claims and the supply proportion of government taxes on insurance nec for other taxes on products.

**Motor vehicle insurance**

Motor vehicle insurance service charges cover both compulsory third party (personal injury) insurance, and comprehensive and third party property insurance on motor vehicles.

Premiums and claims for motor vehicle property and compulsory third party (personal injury) insurance are obtained from *Quarterly General Insurance Performance Statistics; General Insurance Supplementary Statistical Tables; Half Yearly General Insurance Bulletin* and *Selected Statistics on the General Insurance Industry*, published by the APRA in quarterly, half-yearly and annual bulletins.

APRA data are classified in a consistent manner to national accounts requirements. Domestic comprehensive motor vehicle insurance is applicable directly to household final consumption expenditure, commercial comprehensive motor vehicle insurance is categorised to business and government. Compulsory third party motor vehicle insurance for householders is obtained by multiplying total compulsory third party motor vehicle insurance by the proportion of personal vehicles to business and government vehicles from the ABS *Survey of Motor Vehicle Use, Australia* (cat. no. 9208.0).

Expected claims are derived by using a centred five year moving average of claims incurred.

Premium supplements are added together with personal premiums to give the total value of premiums for both motor vehicle property and compulsory third party (personal injury) insurance. Premium supplements for each type of motor vehicle insurance are calculated using the proportion of motor vehicle insurance premiums to total general insurance premiums multiplied by total investment earnings on general insurance technical reserves.

Personal premiums paid plus premium supplements less expected personal claims incurred gives the value of the service charge which is included in household final consumption expenditure.

Taxes on products are added to derive a purchases price value. Taxes on products are allocated to this product using a number of methods. These include the proportion of GST from net of premiums less claims and the direct amount of government third party insurance taxes for other taxes on products.

**Health insurance**

The insurance service charge for health insurance is calculated in the same way as for general insurance of householders' effects.

Information about premiums paid and claims incurred by households from health insurers is sourced from the Private Health Insurance Administration Council publication *Operations of the Registered Health Benefits Organisations.*

Expected claims are derived by using a centred five year moving average of claims incurred.

Personal premiums paid plus premium supplements less expected personal claims incurred gives the value of the service charge which is included in household final consumption expenditure.

Premium supplements are added together with personal premiums to give the total value of premiums. Premium supplements are calculated by dividing health insurance premiums by total general insurance premiums multiplied by investment earnings on general insurance technical reserves.

The Medicare levy paid by individuals is considered to be an element of income tax levied by the Commonwealth Government. As such, it is not included in household final consumption expenditure.

**Other non-life insurance by households as consumers**

This is the service charge for various classes of insurance which are taken out by households, but which have not been explicitly discussed above. Included are travel, consumer credit, marine hull, and sickness and accident.

Premiums and claims for the relevant classes of insurance business are obtained from *Quarterly General Insurance Performance Statistics; General Insurance Supplementary Statistical Tables; Half Yearly General Insurance Bulletin* and *Selected Statistics on the General Insurance Industry*, published by the Australian Prudential Regulation Authority in quarterly, half-yearly and annual bulletins.

The households' share of both premiums and claims for each class of business are estimated using available information and subjective judgement.

Expected claims are derived by using a centred five year moving average of claims incurred.

Premium supplements are added together with personal premiums to give the total value of premiums.

Premium supplements are calculated using the proportion of households' premiums for the relevant classes of business to total general insurance premiums, multiplied by total investment earnings on general insurance technical reserves.

Personal premiums paid plus premium supplements less expected personal claims incurred gives the value of the service charge which is included in household final consumption expenditure.

Taxes on products are added to derive a purchases price value. Taxes on products are allocated to this product using a number of methods. These include the proportion of GST from net of premiums less claims and supply proportions of government taxes on insurance n.e.c. for other taxes on products.

**Life insurance and superannuation**

Premiums and contributions paid by policy-holders to life insurance corporations and superannuation are considered to include an insurance service charge element. A proportion of life insurance and superannuation premiums/contributions is actually paid by employers on behalf of their employees. However, for national accounts purposes these premiums are included in employers' social contributions, which is a component of compensation of employees. The employee pays the insurance service charge (a component of household final consumption expenditure) and invests in life insurance and superannuation funds recorded in the households financial account.

For life insurance corporations and friendly societies, the insurance service charge is equal to the cost of running the business plus a profit margin. The service charge is compiled from data on life insurance statutory funds available from *Quarterly Life Insurance Performance Statistics; Half-Yearly Life Insurance Bulletin* and the *Annual Friendly Society Bulletin*, published by the Australian Prudential Regulatory Authority. The profit margin is calculated by estimating a proxy return on equity (where the return on equity is defined as gross operating surplus over shareholders' funds).

For pension funds the insurance service charge is equal to cost of running the fund, included are administrative and investment expenses. The service charge is compiled from data on pension funds available from *Managed Funds, Australia* (cat. no. 5655.0) and *National Accounts, Financial Accounts* (cat. no. 5232.0) published by the ABS; *Quarterly Superannuation Performance Statistics* and the *Annual Superannuation Bulletin* published by the Australian Prudential Regulatory Authority.

Taxes on products are added to derive a purchases price value. Other taxes on products are allocated to this product using supply proportions of government taxes on insurance n.e.c.

**Workers' compensation insurance**

The insurance service charge for workers' compensation insurance paid by employers is included in household final consumption expenditure. The insurance service charge measures the value of services provided by the insurance enterprises in arranging payments for claims in exchange for the receipts of premiums.

Premiums and claims for the relevant classes of insurance business are obtained from, *Quarterly General Insurance Performance Statistics; General Insurance Supplementary Statistical Tables; Half Yearly General Insurance Bulletin* and *Selected Statistics on the General Insurance Industry*, published by the Australian Prudential Regulation Authority in quarterly, half-yearly and annual bulletins.

Premium supplements are added together with personal premiums to

give the total value of premiums. Premium supplements are calculated using the proportion of workers' compensation insurance premiums to total general insurance premiums, multiplied by total investment earnings on general insurance technical reserves. Personal premiums paid plus premium supplements less expected personal claims incurred gives the value of the service charge which is included in household final consumption expenditure.

Taxes on products are added to derive a purchases price value. Taxes on products are allocated to this product using a number of methods. These include the proportion of GST from net of premiums less claims and supply proportion of government taxes on insurance n.e.c. for other taxes on products.

***Supply and use balancing process for insurance services***

The initial data is compiled at the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

The SUPC level data are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Current price estimates of purchases of insurance services are re-valued using relevant price deflators from the CPI.

**Financial services**

**Description**

The scope of this item is household expenditure, both actual and imputed, on services provided by financial institutions other than insurers. Three broad categories of expenditure are covered.

The first relates to the charges that households pay explicitly to financial institutions for services rendered. Examples are account-keeping fees; commission on money orders, travellers' cheques and overseas drafts; brokerage on share trading; and financial advisers' charges.

The second covers taxes on production and imports levied by general government on financial transactions undertaken by households. Examples are financial institutions duty and stamp duty incurred by trading in financial instruments. The stamp duty payable on the transfer of titles to residential property is treated as part of the transfer costs of ownership of dwellings (which are included in gross fixed capital formation) and as such is not part of household final consumption expenditure.

The last component is the indirectly charged service charges of banks and other similar financial intermediaries. In the national accounts an imputation is made for the value of the services provided by financial intermediaries, i.e. Financial Intermediation Services Indirectly Measured (FISIM). It is estimated by reference to the difference in interest rates offered to borrowers and depositors and the average levels of outstanding loans and deposits. The payment for financial services is implicit in both the higher interest paid by borrowers and the lower interest received by depositors. That part of this service which relates to personal loans to households to finance household consumption and household deposits held by financial intermediaries is regarded as being paid by persons and included in household final consumption expenditure. FISIM relating to mortgages on dwellings owned by persons is not included in household final consumption expenditure, but is

treated as a component of intermediate consumption in the calculation of gross operating surplus for dwellings owned by persons.

**Current price estimates**

**Explicit charges**

The total value of explicit charges (e.g. account-keeping fees; commission on money orders; travellers' cheques and overseas drafts; brokerage on share trading; and financial advisers' charges) paid by households is calculated using data from the following sources:

- Banks', Credit Unions' and Building Societies' performance statistics published quarterly by the Australian Prudential Regulatory Authority (APRA);
- the Reserve Bank of Australia's (RBA) *Statistical Bulletin*;
- suite of APRA forms - *Quarterly Bank Statement of Financial Performance* and *Quarterly Registered Financial Corporations Statement of Financial Performance;*
- Economic Activity Survey

Taxes on products are added to derive a purchases price value. Taxes and subsidies on products are allocated to specific products using a number of methods. These include household final consumption expenditure proportions in the case of the Goods and Services Tax and supply proportions for other taxes on products.

**FISIM**

FISIM is estimated as the difference between the interest rates on loans and deposits and a pure or reference rate of interest, multiplied by the level of loans and deposits, respectively. The total value of FISIM paid by households is calculated using data from the following sources:

Balance sheets:

- ABS, *National Accounts, Financial Accounts* (cat. no. 5232.0);
- Australian Prudential Regulatory Authority (APRA) *Monthly Bank Statement of Financial Position*- detail breakdown for bank loans and deposits;
- ABS*, Assets and Liabilities of Australian Securitisers* (cat. no. 5232.0.55.001); and
- Reserve Bank of Australia's (RBA) *Statistical Bulletin*.

Income and expenditure:

- RBA: *Annual Report*; *Financial Stability Report* (6 monthly); *Statement of Monetary Policy* (quarterly);
- ABS Publications: *Balance of Payments and International Investment Position (*cat. no. *5302.0); Statistics of Financial Institutions* (cat. no. 5661.0) (note: cat. no. 5661.0 has ceased but for completeness it is included as the data in this publication still underpins the estimates);
- ABS Collections - Economic Activity Survey, Quarterly Survey of Financial Information, Government Finance Statistics;
- suite of APRA forms - *Quarterly Bank Statement of Financial* Performance and *Quarterly Registered Financial Corporations Statement of Financial Performance*;
- APRA publications: *Quarterly Banks, Building Societies and Credit Unions Performance Statistics*; and
- ad-hoc reports: annual reports for small subsectors such as listed investment companies, bank annual reports and private consultant banking reports.

Interest rates:

- RBA *Statistical Bulletin.*

To compile household final consumption expenditure FISIM estimates for banks, other depository corporations and securitisers, the total interest receivable and payable estimates by financial instruments (i.e. deposits, bills of exchange, one-name paper, bonds and loans) and counterparty sector and subsector flows for the following five sectors and subsectors are compiled:

- Rest of the world;
- Reserve Bank Of Australia;
- Banks;
- Other depository corporations;
- Securitisers.

Three datasets are required to compile the interest flows, namely:

- total interest payable and receivable;
- interest rates for relevant financial instruments for various sectors and subsectors; and
- balance sheets for the five sectors and subsectors.

The next step is to calculate FISIM for loans and deposits (banks and other depository corporations) and for loans (securitisers). That is:

- For banks and other depository corporations, FISIM is derived as the sum of the counterparty sector and subsector stock levels of loans and deposits, i.e.:

*[(counterparty loan rate - reference rate)*counterparty stock of loans] + [(reference rate - counterparty deposit rate)*counterparty stock of deposits],*
where the reference rate is the mid-point between the average interest rate on loans and the average interest rate on deposits.

- For securitisers, FISIM is derived as the sum of the counterparty sector and subsector stock levels of loans, i.e.:

*[(counterparty loan rate - reference rate)*counterparty stock of loan],*
where the reference rate is the weighted average bond yield.

The above calculations are undertaken in separate loan and deposit FISIM tables for each of the three FISIM generating institutions. Each table captures the counterparty sector and subsector loan and deposit balances, their respective interest flows and interest margins and the subsequent FISIM estimates.

The FISIM tables mentioned above for loans and deposits enable the allocation of FISIM by final use (i.e. household final consumption expenditure), exports and intermediate use directly.

***Supply and use balancing process for finance services***

The initial data is compiled at the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

The SUPC level data are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results. For more information on the product flow method refer to Chapter 7.

**Volume estimates**

**Explicit charges**

Current price estimates of purchases of direct financial services by Australian residents are re-valued using relevant price deflators from the CPI.

**FISIM**

The detailed information from the current price FISIM loan and deposit tables for the four financial intermediaries (i.e. banks, other depository corporations, central borrowing authorities and securitisers) are used to construct chain volume measures.

Chain volume FISIM measures are produced for the total, household final consumption expenditure, intermediate use of ownership of dwellings, intermediate use by general government, total intermediate use, exports and imports.

- Laspeyres chain volume estimates of balances (loans and deposits) by counterparty sectors and subsectors are calculated by deflating the current price estimates using the CPI All groups.
- The deflated loans and deposits are multiplied by the associated interest margin for the previous year to produce estimates of FISIM in prices of the previous year.
- The estimates in the previous step are summed across the four financial intermediaries to produce Laspeyres chain volume estimates of total FISIM, final use (i.e. household final consumption expenditure), exports, imports, total intermediate use and dwellings and general government intermediate use.

**Other goods and services**

**Current price estimates**

The Household Expenditure Survey provides the primary benchmarks for miscellaneous services including personal outlays on dry cleaning, photographic services, laundering, removalist services, funeral services and professional services (other than health care services) such as legal and accounting services.

The following outlines adjustments that are made:

- adjustments to cover remote and non-private dwellings,
- adjustments to capture current expenditure of NPISH units providing professional services such as other social assistance services not elsewhere classified (including elderly, disabled, marriage and adoption services), legal services as compiled based on current grants from government to NPISH units as sourced from annual time series data from Government Finance Statistics, and
- adjustments to capture current grants and donations from corporations and households to NPISH units providing childcare services, interest groups not elsewhere classified (including welfare fundraising services) as extrapolated from the ABS publication *Australian National Accounts: Non-Profit Institutions Satellite Account* (cat. no. 5256.0), and
- net expenditure overseas.

Current expenditure on NPISHs such as religious services are sourced from current grants and donations from corporations and households to NPISH units providing religious services extrapolated from the ABS publication *Australian National Accounts: Non-Profit Institutions Satellite Account.*(cat. no. 5256.0).

For the years where HES data are not available the annual estimate is the sum of the four quarters.

When the next HES benchmark becomes available a linear interpolation technique is used to align the current estimates to best fit the linear model between the two benchmarks.

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| | The initial data is compiled according to the COICOP classification. This is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Current price estimates on household expenditures on other goods and services by Australian residents are re-valued using relevant price deflators from the Consumer Price Index. |

Latest year

10.59 For the majority of HFCE components, annual estimates are constructed by summing of the quarterly estimates for the years after the latest Supply and Use tables.

10.60 The exception to this is Telecommunication services where annual estimates of expenditure on internet services for the years after the latest supply and use tables are derived using data on the number of households with internet access from *Household Use of Information Technology, Australia* (cat. no. 8146.0) and price information from the CPI.

*Sources and methods – Quarterly*

10.61 The tables below outline the data sources and methods used in the estimation of quarterly household final consumption expenditure by COICOP category. They include both the current price estimates and volume estimates.

Table 10.14 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Food and non-alcoholic beverages

| Item | Comment |
|---|---|
| **Current price estimates** | Quarterly indicator series for Food and non-alcoholic beverages are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (RISWIS) (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).<br><br>The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for Food and non-alcoholic beverages past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following outlines adjustments that are made:<br><br>• net expenditure overseas;<br><br>• backyard production; and |

| | |
|---|---|
| | • adjustment for the underground economy. |
| **Volume estimates** | Current price estimates of purchases of food and non-alcoholic beverages by Australian residents in Australia are re-valued using a weighted average of components from the CPI Food and non-alcoholic Beverages group.<br><br>Current price estimates of purchases of food and non-alcoholic beverages by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>Chain volume estimates of Food and non-alcoholic beverages are derived by aggregating the elemental volume components above. |

Table 10.15 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Alcoholic beverages

| Item | Comment |
|---|---|
| **Current price estimates** | Quarterly indicator series for Alcoholic beverages are derived by weighting together series from the ABS *Retail Trade, Australia* (cat. no. 8501.0) and the *Quarterly Business Indicator Survey* (cat. no. 5676.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (RISWIS) (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).<br><br>The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for Alcoholic beverages past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following outlines adjustments that are made:<br><br>• net expenditure overseas;<br><br>• backyard production; and<br><br>• taxes refunded through the Tourist Refund Scheme. |
| **Volume estimates** | Current price estimates of purchases of alcohol by Australian residents in Australia are re-valued using a weighted average of components from the CPI Alcoholic beverages sub-group.<br><br>Current price estimates of purchases of alcohol by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>Chain volume estimates of Alcoholic beverages are derived by aggregating the elemental volume components above. |

Table 10.16 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE— Cigarettes and Tobacco

| Item | Comment |
|---|---|
| **Current price estimates** | The quarterly indicator for Cigarettes and tobacco is the original current price Cigarette and Tobacco Product Manufacturing series from *Quarterly Business Indicators, Australia* (cat. no. 5676.0).<br><br>The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for Cigarettes and tobacco past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following adjustment is made:<br><br>• net expenditure overseas. |
| **Volume estimates** | Current price estimates of purchases of cigarettes and tobacco by Australian residents in Australia are re-valued using the CPI for Tobacco.<br><br>Current price estimates of purchases of cigarettes and tobacco by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>Chain volume estimates of Cigarettes and tobacco are derived by aggregating the elemental volume components above. |

Table 10.17 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Clothing and footwear

| Item | Comment |
|---|---|
| **Current price estimates** | Quarterly indicator series for Clothing and footwear are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (RISWIS) (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).<br><br>The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for Clothing and footwear past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following outlines adjustments that are made:<br><br>• net expenditure overseas;<br><br>• repair and maintenance;<br><br>• taxes refunded through the Tourist Refund Scheme; and<br><br>• adjustment for the underground economy. |
| **Volume estimates** | Current price estimates of purchases of clothing and footwear by Australian residents in Australia are re-valued using a weighted average of components from the CPI Clothing and footwear group. |

| | |
|---|---|
| | Current price estimates of purchases of clothing and footwear by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>Chain volume estimates of Clothing and footwear are derived by aggregating the elemental volume components above. |

Table 10.18 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Housing, water, electricity, gas and other fuels

| Item | Comment |
|---|---|
| **Imputed rentals for housing**<br>**Current price estimates** | Quarterly estimates of the imputed rent of owner-occupiers are obtained by multiplying the stock of owner-occupied dwellings by the average rent paid.<br><br>Information regarding the stock of owner-occupied dwellings and the rents paid for those dwellings are obtained from the Census of Population and Housing, conducted every five years.<br><br>The stock of owner-occupied dwellings includes all occupied private dwellings and a proportion of unoccupied private dwellings, but excludes short-term caravans in caravan parks. Private dwellings include separate houses, duplexes, townhouses, flats (including those which are part of a building that is used for commercial purposes e.g. a retail shop) and caravans used for long-term accommodation.<br><br>For intercensal and post-Census periods, the stock is moved forward using the number of dwelling unit completions from *Building Activity, Australia* (cat. no. 8752.0). This is then modified by a factor to take account of other changes to the stock of dwellings, i.e. demolitions, net conversions from commercial uses and dwelling completions not in the scope of the survey. For intercensal periods, this factor is calculated by dividing the change in the stock of owner-occupied dwellings between Census benchmarks by the total number of dwelling completions in the period. For the post-Census period, the factor is assumed to be the same as that for the latest intercensal period.<br><br>The benchmark average rent paid for owner-occupied dwellings is calculated by multiplying average rents reported in the Census (adjusted to exclude rents at less than market value) for privately rented dwellings in various categories (major urban, other urban, rural etc., cross-classified by the structure of the dwelling and number of bedrooms) by the number of owner-occupied dwellings in those same categories.<br><br>For intercensal and post-Census periods, the benchmark average rent paid is updated using data from the Survey of Income and Housing (*Housing Occupancy and* Costs (cat. no. 4130.0)) and industry reports from Australian Property Monitors and the Real Estate Institute of Australia.<br><br>The latest benchmark of average rent paid is moved forward using a weighted average of price indexes from the CPI for privately-owned dwelling rents. The weights used have been derived from the Census of Population and Housing.<br><br>Separate estimates of imputed rentals for housing are published on an annual basis in *Australian System of National Accounts* (cat. no. 5204.0). |

**Volume estimates**

Chain volume estimates of imputed rentals for housing are derived using the relative proportion of the nominal current price values for imputed rentals to the sum of actual and imputed rentals for housing. The derived ratio is applied to the chain volume estimate for total dwelling rent.

**Actual rentals for housing**
**Current price estimates**

Quarterly estimates of actual rent for housing is the difference between total dwelling rent and the imputed rent of owner-occupiers.

Separate estimates of actual rent for housing are published on an annual basis in *Australian System of National Accounts* (cat. no. 5204.0).

**Volume estimates**

Chain volume estimates of actual rentals for housing are derived using the relative proportion of the nominal current price values for actual rentals to the sum of actual and imputed rentals for housing. The derived ratio is applied to the chain volume estimate for total dwelling rent.

**Total dwelling rent**
**Current price estimates**

Quarterly estimates of total dwelling rent (the imputed rent of owner-occupiers plus actual rent paid by renters) are obtained by multiplying the total stock of dwellings by the average rent paid.

Similar to imputed rentals for housing, information regarding the stock of total dwellings and rents paid is obtained from the Census of Population and Housing.

The stock of total dwellings includes all occupied private dwellings and a proportion of unoccupied private dwellings, but excludes short-term caravans in caravan parks. Private dwellings include separate houses, duplexes, townhouses, flats (including those which are part of a building that is used for commercial purposes e.g. a retail shop) and caravans used for long-term accommodation.

For intercensal and post-Census periods, the stock of total dwellings is again moved forward using the number of dwelling unit completions from *Building Activity, Australia* (cat. no. 8752.0). This is then modified by a factor to take account of other changes to the stock of dwellings, i.e. demolitions, net conversions from commercial uses, and dwelling completions not in the scope of the survey. For intercensal periods, this factor is calculated by dividing the change in the total stock of dwellings between Census benchmarks by the total number of dwelling completions in the period. For the post-Census period, the factor is assumed to be the same as that for the latest intercensal period.

The benchmark for average rent paid is calculated by multiplying the average rents reported in the Census (adjusted to exclude rents at less than market value) for privately rented dwellings in various categories (major urban, other urban, rural etc., cross classified by the structure of the dwelling and number of bedrooms) by the number of rented dwellings in those same categories.

For intercensal and post-Census periods, the benchmark average rent paid is updated using data from the Survey of Income and Housing (*Housing Occupancy and* Cost (cat. no. 4130.0)) and industry reports from Australian Property Monitors and the Real Estate Institute of Australia.

The latest benchmark of average rent paid is moved forward using a weighted average of price indexes from the CPI for privately-owned and government-owned dwelling rents. The weights used have been derived

from the Census of Population and Housing.

**Volume estimates**

Quarterly volume estimates for total rent for housing are obtained by quantity revaluing the current price estimates using the average net capital stock of dwellings. Quarterly estimates of capital stock are derived by linearly interpolating and extrapolating the annual estimates.

Initial State allocations are derived using estimated resident population.

**Other services related to the dwelling**
**Current price estimates**

Quarterly indicator series for other services related to the dwelling are derived by multiplying estimated resident population by the CPI for water and sewerage.

The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for other services related to the dwelling past the latest available benchmark.

State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.

No additional adjustments are made to current price estimates of other services related to the dwelling.

**Volume estimates**

Current price estimates of purchases of services relating to the dwelling by Australian residents are re-valued using the CPI for water and sewerage.

**Total rent and other dwelling services**
**Volume estimates**

Chain volume estimates of rent and other dwelling services are derived by aggregating the elemental volume estimates for these subcategories.

**Electricity, gas and other fuels**
**Current price estimates**

Quarterly indicators for household expenditure on electricity and gas are derived from revenue information provided by major retail suppliers in each State and Territory.

The quarterly indicator series for other household fuels is derived from sales of heating oil and kerosene from the monthly *Australian Petroleum Statistics* report, published by the Department of Resources, Energy and Tourism, together with price data from the CPI on gas and other household fuels.

These indicator series are to used allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

The national estimate for electricity is apportioned across States and Territories by applying weights derived from data published by the Electricity Supply Association of Australia (ESAA). Similarly, gas is allocated using data from the Australian Bureau of Agricultural and Resource Economics and Sciences and other household fuels is apportioned according to data from the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0).

No additional adjustments are made to current price estimates of Electricity, gas and other fuels.

**Volume estimates**

Current price estimates of purchases of electricity, gas and other fuels by Australian residents are each re-valued using relevant components of the CPI Utilities sub-group.

Table 10.19 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Furnishings and household equipment

| Item | Comment |
|---|---|
| **Furniture and furnishings, carpets and other floor coverings** | |
| **Current price estimates** | Quarterly indicator series for furniture and furnishings, carpets and other floor coverings are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (RISWIS) (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).<br><br>The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for furniture and furnishings, carpets and other floor covering past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following outlines adjustments that are made:<br>• net expenditure overseas;<br>• taxes refunded through the Tourist Refund Scheme; and<br>• for the underground economy. |
| **Volume estimates** | Current price estimates of purchases of furniture and furnishings, carpets and other floor coverings in Australia are re-valued using the CPI for Furniture and furnishings. |
| **Household textiles** | |
| **Current price estimates** | Quarterly indicator series for household textiles are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from *the* 2005-06 Retail and Wholesale Industries Survey (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).<br><br>The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for household textiles past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following outlines adjustments that are made:<br>• net expenditure overseas; and<br>• taxes refunded through the Tourist Refund Scheme. |
| **Volume estimates** | Current price estimates of purchases of household textiles in Australia are re-valued using a weighted average of relevant components from the CPI. |
| **Household appliances** | |
| **Current price estimates** | Quarterly indicator series for household appliances are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).<br><br>The indicator at the national level is used to allocate benchmarked |

annual estimates to the four quarters of the year, as well as to derive quarterly estimates for household appliances past the latest available benchmark.

State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.

The following outlines adjustments that are made:

- net expenditure overseas;
- taxes refunded through the Tourist Refund Scheme; and
- repairs and maintenance.

**Volume estimates**

Current price estimates of purchases of household appliances in Australia are re-valued using a weighted average of relevant components from the CPI Household appliances, utensils and tools sub-group.

**Glassware, tableware and household utensils**

**Current price estimates**

Quarterly indicator series for glassware, tableware and household utensils are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).

The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for glassware, tableware and household utensils past the latest available benchmark.

State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.

The following outlines adjustments that are made:

- net expenditure overseas; and
- taxes refunded through the Tourist Refund Scheme.

**Volume estimates**

Current price estimates of purchases of glassware, tableware and household utensils in Australia are re-valued using a weighted average of relevant components from the CPI Household appliances, utensils and tools sub-group.

**Tools and equipment for house and garden**

**Current price estimates**

Quarterly indicator series for tools and equipment for house and garden are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).

The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for tools and equipment for house and garden past the latest available benchmark.

State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.

The following outlines adjustments that are made:

- net expenditure overseas;

| | |
|---|---|
| | • taxes refunded through the Tourist Refund Scheme; and<br>• repairs and maintenance. |
| **Volume estimates** | Current price estimates of purchases of tools and equipment for house and garden in Australia are re-valued using the CPI for Tools and equipment for house and garden. |
| **Non-durable household goods** | |
| **Current price estimates** | Quarterly indicator series for non-durable household goods are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).<br><br>The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for non-durable household goods past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following outlines adjustments that are made:<br>• net expenditure overseas; and<br>• taxes refunded through the Tourist Refund Scheme. |
| **Volume estimates** | Current price estimates of purchases of non-durable household goods in Australia are re-valued using a weighted average of relevant components from the CPI. |
| **Total furnishings and household equipment** | |
| **Volume estimates** | Current price estimates of purchases of furnishings and household equipment by non-residents in Australia are re-valued using a weighted average of relevant components from the CPI.<br><br>Current price estimates of purchases of furnishings and household equipment by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>In deriving the chain volume estimates of furnishings and household Equipment, the elemental volume estimate of purchases by non-residents in Australia is subtracted from the sum of the other elemental volume components above. |

Table 10.20 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Health

| Item | Comment |
|---|---|
| **Medicines, medical aids and therapeutic appliances** | |
| **Current price estimates** | Quarterly indicator series for total expenditure on medicines, medical aids and therapeutic appliances are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).<br><br>Government Finance Statistics provide an estimate of the benefits paid by the Government as part of the Pharmaceutical Benefits Scheme. This |

estimate, at the national level, is apportioned across each State and Territory based on the relative proportions in the indicator series above.

These amounts are then deducted from the retail-based series to obtain indicators for household expenditure on medicines, medical aids and therapeutic appliances.

The national indicator derived from this process is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for medicines, medical aids and therapeutic appliances past the latest available benchmark.

State/Territory estimates are derived from the national estimate using the relative proportions in the indicator series.

The following adjustment is made:

- net expenditure overseas.

**Volume estimates**

Current price estimates of purchases of medicines, medical aids and therapeutic appliances in Australia are re-valued using the CPI for Pharmaceutical products.

**Ambulatory health care**

**Current price estimates**

Quarterly indicator series for total expenditure on ambulatory health care are compiled using data from the Department of Health and Ageing (DoHA) on the fees charged for medical services and procedures where Medicare benefits were paid, as well as information from the Private Health Insurance Administration Council's (PHIAC) *A report on the private health insurance claims by household*s.

Government Finance Statistics provide an estimate of the benefits paid by the Government under Medicare. This estimate, at the national level, is apportioned across each State and Territory based on the relative proportions in the indicator series above.

These amounts are deducted from DoHA and PHIAC based series to obtain indicators for household expenditure on ambulatory health care.

The national indicator derived from this process is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for ambulatory health care past the latest available benchmark.

State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.

The following outlines adjustments that are made:

- net expenditure overseas; and
- adjustment for the underground economy.

**Volume estimates**

Current price estimates of purchases of ambulatory health care in Australia are re-valued using relevant components from the CPI Health group.

**Hospital, ambulance services and nursing home care**

**Current price estimates**

The Private Health Insurance Administration Council's series on health insurance benefits paid for hospital care is used as the quarterly indicator for household expenditure on private hospitals.

The indicator for fees paid to public hospitals, nursing homes, and for ambulance services is data from the Department of Health and Ageing

| | |
|---|---|
| | on the fees charged for medical services and procedures where Medicare benefits were paid.<br><br>These indicators are used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for hospital, ambulance services and nursing home care past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following adjustment is made:<br><br>• net expenditure overseas. |
| **Volume estimates** | Current price estimates of purchases of hospital, ambulance services and nursing home care are re-valued using relevant component of the CPI Medical, dental and hospital services sub-group. |
| **Total Health**<br>**Volume estimates** | Current price estimates of purchases of health by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>Current price estimates of purchases of health by non-residents in Australia as re-valued using a weighted average of relevant components from the CPI Health group.<br><br>In deriving chain volume estimates of health, the elemental volume estimate of purchases by non-residents in Australia is subtracted from the sum of the other elemental volume components above. |

Table 10.21 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Transport

| Item | Comment |
|---|---|
| **Purchase of vehicles**<br>**Current price estimates** | |
| **New motor vehicles** | The number of new motor vehicle sales by type of vehicle and sector (private, business and government), and the average price of these sales are obtained quarterly from the Federal Chamber of Automotive Industries' VFACTS report.<br><br>From these data, the quarterly indicator series for purchase of new motor vehicles is derived by multiplying the number of sales of each type of vehicle by their average sale price and aggregating.<br><br>The indicators for all the subcomponents of this COICOP category (New motor vehicles, Used vehicles from other sectors and Dealers' margins) are summed to derive an indicator for total purchase of vehicles. The aggregated indicator is used to allocate benchmarked annual estimates of purchase of vehicles to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.<br><br>The national estimate for purchase of vehicles is apportioned across each State/Territory using the relative proportions in the indicator series.<br><br>No additional adjustments are made to current price estimates of new motor vehicles purchases. |
| **Used vehicles from other sectors** | Quarterly indicator series for purchases of used vehicles from other |

sectors are based on movements in the average value of new motor vehicle purchases from [q-6] to [q-12].

The indicators for all the subcomponents of this COICOP category (New motor vehicles, Used vehicles from other sectors and Dealers' margins) are summed to derive an indicator for total purchase of vehicles. The aggregated indicator is used to allocate benchmarked annual estimates of purchase of vehicles to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

The national estimate for purchase of vehicles is apportioned across each State/Territory using the relative proportions in the indicator series.

No additional adjustments are made to current price estimates of used vehicles from other sectors.

**Dealers' margins**

Quarterly indicator series for dealers' margins on used vehicles traded between households through dealers are based on movements in the average value of new motor vehicle purchases from [q-6] to [q-12].

The indicators for all the subcomponents of this COICOP category (New motor vehicles, Used vehicles from other sectors and Dealers' margins) are summed to derive an indicator for total purchase of vehicles. The aggregated indicator is used to allocate benchmarked annual estimates of purchase of vehicles to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

The national estimate for purchase of vehicles is apportioned across each State/Territory using the relative proportions in the indicator series.

No additional adjustments are made to current price estimates of dealers' margins.

**Volume estimates**

Current price estimates of purchases of motor vehicles by Australian residents in Australia are re-valued using the CPI for Motor vehicles.

Current price estimates of purchases of motor vehicles by Australian residents overseas are re-valued using a composite index of overseas CPIs.

Chain volume estimates of purchase of vehicles are derived by summing the elemental volume components above.

**Operation of personal transport equipment**

**Current price estimates**

**Motoring goods**

The quarterly indicator for household expenditure on fuel is derived from petroleum sales volumes from *Australian Petroleum Statistics*, published by the Department of Resources, Energy and Tourism (DRET), together with price data from the CPI on Automotive fuel.

Similarly, the quarterly indicator for household purchases of tyres is petroleum sales volumes from *Australian Petroleum Statistics* multiplied by the CPI for Spare parts and accessories for motor vehicles.

For household expenditure on batteries and car accessories, the quarterly indicator is derived from the number of vehicles registered to households and price data from the CPI.

These indicators are aggregated to derive an indicator for total motoring goods, which is then used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

The national estimate for motoring goods is apportioned across each

State and Territory by applying weights derived from the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0).

The following adjustment is made:

- net expenditure overseas.

**Repair and maintenance expenditure**

The quarterly indicator for household expenditure on repairs and servicing is petroleum sales volumes from *Australian Petroleum Statistics*, published by the Department of Resources, Energy and Tourism (DRET), multiplied by the CPI for Maintenance and repair of motor vehicles.

For panel beating and smash repairs, the indicator is the number of vehicles registered to households multiplied by the CPI for Motor vehicle insurance.

These indicators are aggregated to derive an indicator for total repair and maintenance expenditure, which is then used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

The national estimate for repair and maintenance expenditure is apportioned across each State and Territory by applying weights derived from the *Household Expenditure Survey, Australia: Summary or Results* (cat. no. 6530.0).

The following adjustment is made:

- net expenditure overseas.

**Miscellaneous motoring expenditure**

The quarterly indicator for miscellaneous motoring expenses paid by households is the CPI for Other services in respect of motor vehicles multiplied by the number of vehicles registered to households.

This indicator is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

The national estimate for miscellaneous motoring expenditure is apportioned across each State and Territory by applying weights derived from the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0).

The following adjustment is made:

- net expenditure overseas.

**Volume estimates**

Current price estimates of expenditures on operation of vehicles by Australian residents in Australia are each re-valued using relevant components of the CPI Private motoring sub-group.

Current price estimates of expenditures on operation of vehicles by non-residents in Australia are re-valued using a weighted average of relevant components from the CPI.

Current price estimates of expenditures on operation of vehicles by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.

In deriving volume estimates of operation of vehicles, the elemental volume estimate of purchases by non-residents in Australia is subtracted from the total of the other elemental volume components above.

**Transport services**

**Passenger transport by railway**

**Current price estimates**

Quarterly indicator series for passenger transport by railway are derived using the revenue data of government transport authorities, from Government Finance Statistics, and data from private operators of rail services.

The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for passenger transport by railway past the latest available benchmark.

State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.

The following adjustment is made:

- net expenditure overseas.

**Volume estimates**

Current price estimates of expenditures on passenger transport by railway in Australia are re-valued using the CPI for Urban transport fares.

**Passenger transport by road**

**Current price estimates**

Quarterly indicator series for household expenditure on bus fares is derived using the revenue data of government transport authorities, from Government Finance Statistics, and data from major private operators of bus services.

For expenditure on taxi and hire car charges, the indicator is the CPI price data on taxi fares, multiplied by an estimate of usage.

These indicators are used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.

The following outlines adjustments that are made:

- net expenditure overseas; and
- adjustment for the underground economy.

**Volume estimates**

Current price estimates of expenditures on passenger transport by road in Australia are each re-valued using relevant components of the CPI Transport group.

**Passenger transport by air**

**Current price estimates**

The quarterly indicator series for domestic air fares is based on revenue data provided by the major airlines.

For international air fares, the indicator is derived using data on imports of transportation services from the ABS Balance of Payments and revenue information provided by the major airlines.

These indicator series are aggregated to derive an indicator for total passenger transport by air, which is then used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

The national estimates for passenger transport by air are apportioned across each State and Territory by applying weights derived from the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0).

The following adjustment is made:

- net expenditure overseas.

**Volume estimates**

Current price estimates of expenditures on passenger transport by air in Australia are re-valued using relevant components of the CPI Holiday travel and accommodation sub-group.

**Passenger transport by sea and inland water**

**Current price estimates**

Quarterly indicator series for household expenditure on domestic passenger transport by sea are derived using the revenue data of public transport authorities, from Government Finance Statistics.

For international shipping fares, the quarterly data are moved forward using a constant growth rate.

These indicator series are aggregated to derive an indicator for total passenger transport by sea and inland water, which is then used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.

The following adjustment is made:

- net expenditure overseas.

**Volume estimates**

Expenditures on domestic shipping fares in Australia are re-valued using the CPI for Urban transport fares.

Expenditures on overseas shipping fares in Australia are re-valued using a specially constructed cruise ship price index.

**Total transport services**

**Volume estimates**

Current price estimates of expenditure on transport services by non-residents in Australia are re-valued using the CPI for Urban transport fares.

Current price estimates of expenditures on transport services by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.

In deriving the chain volume estimates of transport services, the elemental volume estimate of expenditure by non-residents in Australia is subtracted from the total of the other elemental volume components above.

Table 10.22 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Communications

| Item | Comment |
|---|---|
| **Postal services** | |
| **Current price estimates** | The quarterly indicator series for postal services is estimated from data provided by Australia Post on the sales of stamps and postage labels, and the hire of mail boxes and bags.<br><br>This indicator is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for postal services past the latest available benchmark.<br><br>The national estimate is apportioned across each State and Territory by applying weights derived from the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0).<br><br>The following adjustment is made:<br><br>• net expenditure overseas. |
| **Volume estimates** | Current price estimates of expenditures on postal services in Australia are re-valued using the CPI for Postal services. |
| **Telecommunication services** | |
| **Current price estimates** | The quarterly indicator for household expenditure on telephone services is derived from revenue data obtained from the major service providers.<br><br>Household expenditure on internet services is derived by linear interpolation and extrapolation of the annual estimates.<br><br>These two series are aggregated to derive an indicator for total telecommunication services, which is then used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.<br><br>The national estimate for telecommunication services is apportioned across each State and Territory by applying weights derived from the *Household Expenditure Survey, Australia: Survey of Results* (cat. no. 6530.0).<br><br>The following adjustment is made:<br><br>• net expenditure overseas. |
| **Volume estimates** | Current price estimates of expenditures on telecommunication services in Australia are re-valued using the CPI for Telecommunication equipment and services. |
| **Total communications services** | |
| **Volume estimates** | Current price estimates of expenditure on communication services by non-residents in Australia are re-valued using the CPI for Communication.<br><br>Current price estimates of expenditures on communication services by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>In deriving the chain volume estimates of communication services, the elemental volume estimate of expenditure by non-residents in Australia is subtracted from the total of the other elemental volume components above. |

Table 10.23 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Recreation and culture

| Item | Comment |
|---|---|
| **Goods for recreation and culture** | |
| **Audio visual, photographic and data processing equipment and accessories** | |
| **Current price estimates** | Quarterly indicator series for audio visual, photographic and data processing equipment and accessories are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (RISWIS) (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).<br><br>The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following outlines adjustments that are made:<br><br>• net expenditure overseas;<br><br>• taxes refunded through the Tourist Refund Scheme; and<br><br>• repairs and maintenance. |
| **Volume estimates** | Current price estimates of purchases of audio-visual, photographic and information processing equipment excluding computers in Australia are re-valued using a weighted average of relevant components from the CPI Audio, visual and computing equipment and services sub-group.<br><br>Current price estimates of purchases of computer equipment in Australia are re-valued using the CPI for Computing equipment.<br><br>Current price estimates of purchases of audio-visual, photographic and information processing equipment by non-residents in Australia are re-valued using a weighted average of relevant components from the CPI Audio, visual and computing equipment and services sub-group.<br><br>Current price estimates of purchases of audio-visual, photographic and information processing equipment by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>In deriving the chain volume estimates of audio-visual, photographic and information processing equipment, the elemental volume estimate of expenditure by non-residents in Australia is subtracted from the total of the other elemental volume components above. |
| **Other major durables for recreation and culture** | |
| **Current price estimates** | Quarterly indicator series for other major durables for recreation and culture are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (RISWIS) (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).<br><br>The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for other major durables for recreation and culture past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimate using |

the relative proportions in the indicator series.

The following adjustment is made:

- net expenditure overseas

**Volume estimates**

Current price estimates of purchases of other major durables for recreation and culture by Australian residents in Australia are re-valued using a weighted average of components from the CPI Recreation and culture group.

Current price estimates of purchases of other major durables for recreation and culture by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.

Chain volume estimates of other major durables for recreation and culture are derived by aggregating the elemental volume components above.

**Other recreational items and equipment**

**Current price estimates**

For each of the components of other recreational items and equipment, quarterly indicator series are derived by weighting together the series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (RISWIS) (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).

The indicator at the national level for each of these components is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.

The following outlines adjustments that are made:

- net expenditure overseas;
- taxes refunded through the Tourist Refund Scheme; and
- repairs and maintenance.

**Volume estimates**

Current price estimates of purchases of other recreational items and equipment by Australian residents in Australia are re-valued using a weighted average of relevant components from the CPI.

Current price estimates of purchases of other recreational items and equipment by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.

Chain volume estimates of other recreational items and equipment are derived by aggregating the elemental volume components above.

**Total goods for recreation and culture services**

**Volume estimates**

Chain volume estimates of goods for recreation and culture are derived by aggregating the elemental volume components for the three subcategories above.

**Recreational and cultural services**

**Sporting and recreational services**

**Current price estimates**

The quarterly indicator series for sporting and recreational services is estimated resident population multiplied by the CPI for Sports

participation.

This indicator is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for Sporting and recreational services past the latest available benchmark.

The national estimate is apportioned across each State and Territory by applying weights derived from the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0).

The following adjustment is made:

- net expenditure overseas.

**Volume estimates**

Current price estimates of expenditures on sporting and recreational services in Australia are re-valued using the CPI for Sports participation.

**Cultural and entertainment services**

**Current price estimates**

The quarterly indicator for cinema and other admissions is box office takings provided by the Motion Picture Distributors Association of Australia (MPDAA). For Pay TV, the indicator is revenue information from major service providers.

The original current price series for footwear and other personal accessory retailing from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0) is the quarterly indicator for television and video hire.

Quarterly indicator series for veterinary and other services for pets are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (RISWIS) (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).

The above indicators are used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

State/Territory estimates for Cinema and other admissions and Pay TV are derived from the national estimates by applying weights from the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0). State/Territory estimates of Television and video hire and Veterinary and other services for pets are calculated using the relative proportions in the indicator series.

The following outlines adjustments that are made:

- net expenditure overseas; and
- for the underground economy.

**Volume estimates**

Current price estimates of expenditures on cultural and entertainment services in Australia are re-valued using a weighted average of relevant components from the CPI Recreation and culture group.

**Net losses from gambling**

**Current price estimates**

Quarterly indicators for net losses by resident households on gambling are derived using data provided by Government Finance Statistics. These data include taxes levied on gaming machines, casinos and racing, lottery ticket sales and prizes paid, and TAB turnover and dividends paid.

The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for net losses from gambling past the latest available benchmark.

State/Territory estimates are derived from the national estimate using the relative proportions in the indicator series.

The following adjustment is made:

- net expenditure overseas.

**Volume estimates**

Current price estimates of net losses from gambling in Australia are re-valued using the CPI All groups excluding medical and hospital services. This treatment is not an attempt to measure the quantum of gambling as such, but rather to estimate the purchasing power, over other consumer goods and services, attributable to net losses from gambling.

**Total recreational and cultural services**

**Volume estimates**

Current price estimates of expenditure on recreational and cultural services by non-residents in Australia are re-valued using the CPI for Services.

Current price estimates of expenditures on recreational and cultural services by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.

In deriving the chain volume estimates of recreational and cultural services, the elemental volume estimate of expenditure by non-residents in Australia is subtracted from the total of the other elemental volume components above.

**Newspapers, books and stationery**

**Current price estimates**

Quarterly indicator series for newspapers, books and stationery are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (RISWIS) (*Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0)).

The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for newspapers, books and stationery past the latest available benchmark.

State/Territory estimates are derived from the national estimate using the relative proportions in the indicator series.

The following outlines adjustments that are made:

- net expenditure overseas; and
- for the underground economy.

**Volume estimates**

Current price estimates of purchases of newspapers, books and stationery by Australian residents in Australia are re-valued using the CPI for Newspapers, books and stationery.

Current price estimates of purchases of newspapers, books and stationery by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.

Chain volume estimates of newspapers, books and stationery are derived by aggregating the elemental volume components above.

**Total recreation and culture services**

**Volume estimates**

Chain volume estimates of recreation and culture are derived by aggregating the elemental volume estimates for its subcategories.

Table 10.24 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Education services

| Item | Comment |
|---|---|
| **Education services** | |
| **Current price estimates** | |
| **Tertiary education** | Data on government receipts from the Higher Education Contribution Scheme (HECS), obtained from the Government Finance Statistics, is used as the indicator to compile estimates of expenditure on HECS.<br><br>Quarterly indicator series for the remaining components of tertiary education are derived by multiplying estimated resident population by the CPI for Tertiary education.<br><br>The indicators for all the subcomponents of this COICOP category are summed to derive an indicator for total education. The aggregated indicator is used to allocate benchmarked annual estimates of education to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following adjustment is made:<br><br>• net expenditure overseas. |
| **Post-secondary education** | Quarterly indicator series for post-secondary education is derived by multiplying estimated resident population by the CPI for Secondary education.<br><br>The indicators for all the subcomponents of this COICOP category are summed to derive an indicator for total education. The aggregated indicator is used to allocate benchmarked annual estimates of education to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.<br><br>State/Territory estimates are derived from the National estimates using the relative proportions in the indicator series.<br><br>The following adjustment is made:<br><br>• net expenditure overseas. |
| **Primary and secondary education** | The quarterly indicators for household expenditure on government primary and secondary education are benchmarked to the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0) and moved forward using estimated resident population and CPI price data.<br><br>Similarly for private tutoring services, the indicator series are benchmarked to the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0) and moved forward using estimated resident population and the CPI for Secondary education.<br><br>Quarterly indicator series for private primary and secondary education are derived by multiplying estimated resident population by the CPI for Secondary education.<br><br>The indicators for all the subcomponents of this COICOP category are summed to derive an indicator for total education. The aggregated indicator is used to allocate benchmarked annual estimates of |

| | |
|---|---|
| | education to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following adjustment is made:<br><br>• net expenditure overseas. |
| **Preschools** | The quarterly indicators for preschool education are benchmarked to the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0) and moved forward using estimated resident population and the CPI for Preschool and primary education.<br><br>The indicators for all the subcomponents of this COICOP category are summed to derive an indicator for total education. The aggregated indicator is used to allocate benchmarked annual estimates of education to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following adjustment is made:<br><br>• net expenditure overseas. |
| **Volume estimates** | Current price estimates of purchases of education services by Australian residents in Australia are re-valued using the CPI for Education.<br><br>Current price estimates of purchases of education services by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>Chain volume estimates of education services are derived by aggregating the elemental volume components above. |

Table 10.25 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Hotels, catering and restaurants

| Item | Comment |
|---|---|
| **Catering** | |
| **Current price estimates** | Quarterly indicator series for catering are derived by weighting together series from the ABS publications *Retail Trade, Australia* (cat. no. 8501.0) and the Quarterly Business Indicators Survey (cat. no. 5676.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (RISWIS) as published in the ABS publication *Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0).<br><br>The indicator at the national level is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates for catering past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following outlines adjustments that are made:<br><br>• net expenditure overseas; and<br><br>• for the underground economy. |

| | |
|---|---|
| **Volume estimates** | Current price estimates of expenditure on catering services by Australian residents in Australia are re-valued using a weighted average of relevant components from the CPI.<br><br>Current price estimates of expenditure on catering services by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>Chain volume estimates of catering services are derived by aggregating the elemental volume components above. |
| **Accommodation services** | |
| **Current price estimates** | Quarterly indicators for Temporary accommodation services are derived from data on the takings by accommodation establishments from *Tourist Accommodation, Australia* (cat. no. 8635.0).<br><br>For hostel accommodation for the aged or handicapped, the indicator is the CPI All groups.<br><br>These indicators are used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.<br><br>State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.<br><br>The following adjustment is made:<br><br>• net expenditure overseas. |
| **Volume estimates** | Current price estimates of purchases of accommodation services by Australian residents in Australia are re-valued using the CPI for Domestic holiday travel and accommodation.<br><br>Current price estimates of purchases of accommodation services by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>Chain volume estimates of accommodation services are derived by aggregating the elemental volume components above. |
| **Total hotel, cafes and restaurants services** | |
| **Volume estimates** | Chain volume estimates of hotels, cafes and restaurants are derived by aggregating the elemental volume estimates. |

Table 10.26 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Miscellaneous goods and services

| Item | Comment |
|---|---|
| **Personal care** | |
| **Current price estimates** | The quarterly indicator series for hairdressers and beauty salons are benchmarked to the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0) and moved forward using the original current price series for Footwear and other personal accessory retailing from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0).<br><br>For perfumes and cosmetics, quarterly indicator series are derived by weighting together series from the ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (RISWIS) as published in the ABS publication *Retail and Wholesale Industries, Australia: Commodities* (cat. |

no. 8624.0).

The indicators for these two subcomponents are used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.

The following outlines adjustments that are made:

- net expenditure overseas;
- taxes refunded through the Tourist Refund Scheme; and
- for the underground economy.

**Volume estimates**

Current price estimates of purchases of personal care by Australian residents in Australia are re-valued using a weighted average of relevant components from the CPI Furnishings, household equipment and services group.

Current price estimates of purchases of personal care by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.

Chain volume estimates of personal care are derived by aggregating the elemental volume components above.

**Personal effects**

**Current price estimates**

The ABS publication *Retail Trade, Australia* (cat. no. 8501.0) is used as the indicator to derive quarterly estimates for this series.

Quarterly indicator series for both jewellery, watches and clocks and Other personal effects are derived by weighting together series from ABS publication *Retail Trade, Australia* (cat. no. 8501.0), based on weights from the 2005-06 Retail and Wholesale Industries Survey (RISWIS) as published in the ABS publication *Retail and Wholesale Industries, Australia: Commodities* (cat. no. 8624.0).

These indicators at the national level are used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

State/Territory estimates are derived from the national estimates using the relative proportions in the indicator series.

The following outlines adjustments that are made:

- net expenditure overseas; and
- taxes refunded through the Tourist Refund Scheme.

**Volume estimates**

Current price estimates of purchases of personal effects by Australian residents in Australia are re-valued using a weighted average of relevant components from the CPI.

Current price estimates of purchases of personal effects by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.

Chain volume estimates of personal effects are derived by aggregating the elemental volume components above.

| | |
|---|---|
| **Insurance** | |
| **Current price estimates** | |
| **Homeowner and household insurance** | Quarterly estimates of the insurance service charge for general insurance of householders' effects are derived using linear trend interpolation and extrapolation of the annual estimates. |
| **Motor vehicle insurance** | Quarterly estimates of the insurance service charge for motor vehicle insurance are derived using linear trend interpolation and extrapolation of the annual estimates. |
| **Health insurance** | Quarterly estimates of the insurance service charge for health insurance are derived using linear trend interpolation and extrapolation of the annual estimates. |
| **Other non-life insurance by households as consumers** | Quarterly estimates of the insurance service charge for other non-life insurance are derived using linear trend interpolation and extrapolation of the annual estimates. |
| **Life insurance and superannuation** | Quarterly estimates of Life insurance and superannuation are derived using an indicator of the insurance service charge for pension funds and life insurance. (See the methodology for current price insurance services output indicator described for quarterly gross value added (GVA), Insurance and superannuation funds in Table 9.63.)<br><br>This indicator is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark. |
| **Workers' compensation insurance** | Quarterly estimates of Workers' compensation are derived using linear trend interpolation and extrapolation of the annual estimates. |
| **Volume estimates** | Current price estimates of purchases of non-life insurance of householders' effects, other non-life insurance, health insurance and life insurance by Australian residents in Australia are each re-valued using the CPI All groups.<br><br>Current price estimates of purchases of motor vehicle insurance by Australian residents in Australia are re-valued using the CPI for Vehicle insurance.<br><br>Current price estimates of purchases of workers' compensation by Australian residents in Australia are re-valued using the relevant component of the Wage Price Index.<br><br>Current price estimates of purchases of insurance by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>Chain volume estimates of Insurance are derived by aggregating the elemental volume components above. |
| **Financial services** | |
| **Current price estimates** | Quarterly estimates for the explicit charges levied by financial institutions are obtained by linear interpolation and extrapolation of the annual estimates.<br><br>Taxes on financial transactions passed on to households are set to a fixed value each quarter.<br><br>Quarterly estimates of Financial Intermediation Services Indirectly Measured (FISIM) are obtained using an indicator of the household use of FISIM generated by banks. (See the methodology for quarterly gross operating surplus (GOS), financial corporations and quasi-corporations in Table 11.25.) |

This indicator is used to allocate benchmarked annual estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.

The following adjustment is made:

- net expenditure overseas.

**Volume estimates**

Current price estimates of purchases of explicitly charged financial services by Australian residents in Australia are re-valued using the CPI All groups.

Current price estimates of taxes levied on financial transactions are re-valued using the CPI All groups excluding Housing.

Quarterly estimates of FISIM are obtained using a chain volume indicator of the household sector's use of FISIM generated by banks. (See the methodology for the quarterly gross value added finance services described in Table 9.62.) This methodology derives a chain volume estimate for bank total FISIM output and the share of its use allocated to household final consumption expenditure (HFCE).

Current price estimates of purchases of financial services by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.

Chain volume estimates of financial services are derived by aggregating the elemental volume components above.

**Total insurance and other financial services**

**Volume estimates**

Chain volume estimates of insurance and other financial services are derived by aggregating the elemental volume estimates for these subcategories.

**Other services**

**Current price estimates**

**Personal outlays on miscellaneous services**

For dry cleaning and laundering services, the quarterly indicator is mean resident population multiplied by the CPI for Repairs to household durables.

The quarterly indicator for repair and maintenance not elsewhere included is derived using the mean resident population estimates and the CPI for Hairdressing and personal grooming services.

For expenditure on funerals, the quarterly indicator is the number of deaths, taken from *Australian Demographic Statistics* (cat. no. 3101.0).

The quarterly indicators for estimates of household expenditure on child care services are the number of children under 10, from *Australian Demographic Statistics* (cat. no. 3101.0), and the CPI for Child care.

Household expenditure on photographic services is estimated using the CPI for Photographic services as the indicator.

Estimates of domestic services are moved forward quarterly using estimated resident population and the CPI for Gardening services.

Household expenditure on removalists' services, advertising services, services to students at post-secondary institutions, professional services other than health and other miscellaneous services are all derived using the CPI for Services as the indicator.

The above indicators are used to allocate benchmarked annual

| | |
|---|---|
| | estimates to the four quarters of the year, as well as to derive quarterly estimates past the latest available benchmark.<br><br>State/Territory estimates are derived from the National using the relative proportions in the indicator series.<br><br>Estimates of expenditure on public authority fees (such as passport and marriage certificate charges) are moved forward quarterly using a constant growth rate.<br><br>The following outlines adjustments that are made:<br><br>• net expenditure overseas; and<br><br>• for the underground economy. |
| **NPISH** | Quarterly estimates of the current expenditure of non-profit institutions serving households (NPISHs) not elsewhere covered are moved forward using a constant growth rate. |
| **Volume estimates** | Current price estimates of purchases of other services by Australian residents in Australia are re-valued using relevant components of the CPI and Wage Price Index (WPI).<br><br>Current price estimates of purchases of other services by Australian residents overseas are re-valued using a composite index of overseas CPIs adjusted for exchange rate changes.<br><br>Chain volume estimates of other services are derived by aggregating the elemental volume components above. |
| **Total other goods and services ( i.e. personal care, personal effects and other services)** | |
| **Volume estimates** | Chain volume estimates of other goods and services are derived by aggregating the elemental volume estimates for its subcategories. |
| **Total miscellaneous services** | |
| **Volume estimates** | Chain volume estimates of miscellaneous goods and services are derived by aggregating the elemental volume components for Insurance and other financial services and other goods and services. |

## Government final consumption expenditure

### *Concept*

10.62 Government final consumption expenditure (GFCE) is current expenditure by general government bodies on services to the community such as defence, education, and public order and safety. Because these are provided free of charge or at charges which cover only a small proportion of costs, the government is considered to be the consumer of its own output. Government output has no directly observable market value, and so it is valued in the national accounts at its cost of production. GFCE is estimated by deducting the value of any proceeds from sales of government output (e.g. statistical publications by the ABS) from this value of government output.

10.63 GFCE covers net outlays by general government on goods and services for current purposes (i.e. outlays which do not result in the creation of capital assets, or in the acquisition of land and existing buildings or second-hand capital goods). Transfer payments (e.g. interest payments on government debt securities and social assistance benefits) are not included.

10.64 2008 SNA revised the treatment of defence expenditure. The purchases of durable military equipment such as ships and aircraft used as weapons platforms, and outlays on construction works that can only be used for military purposes are now to be treated as capital expenditure. (Expenditure on major items of military equipment with no equivalent civilian use was included in GFCE in 1993 SNA). The ASNA has adopted the 2008 SNA recommendations in this regard. Current expenditures such as compensation of employees and consumable military items such as boots, petrol and bullets, will continue to be treated as GFCE.

10.65 Government final consumption expenditure can be regarded as comprising the following:

| | |
|---|---|
| | compensation of employees paid to employees of general government bodies (other than any employees producing capital goods) |
| *plus* | intermediate consumption of goods and services (e.g. purchases of office supplies and the services of consultants) |
| *less* | the value of goods and services sold by general government to other sectors |
| *plus* | consumption of fixed capital |
| *plus* | the timing adjustment for overseas purchases of defence equipment. |

10.66 Intermediate consumption for general government includes general government's share of the imputed financial services provided by banks and other financial intermediaries (FISIM).

10.67 ASNA classifies GFCE according to the functions of government. Two classifications have been developed, namely, the Government Purpose Classification (GPC) and the Local Government Purpose Classification (LGPC). These are designed for classifying current transactions (such as consumption expenditure, subsidies and current transfers), capital outlays (capital formation and capital transfers) and acquisition of financial assets by general government and its subsectors. The categories used in the classifications are in accordance with the 1993 SNA Classification of the Functions of Government (COFOG) and are as follows:

1 General public services
2 Defence affairs and services
3 Public order and safety affairs
4 Education affairs and services
5 Health affairs and services
6 Social security and welfare affairs and services
7 Housing and community amenity affairs and services
8 Recreational, cultural and religious affairs and services
9 Fuel and energy affairs and services
10 Agriculture, forestry, fishing and hunting affairs and services
11 Mining and mineral resource affairs and services, other than fuels; manufacturing affairs and services; and construction affairs and services
12 Transportation and communication affairs and services
13 Other economic affairs and services
14 Expenditures not classified by major group.

10.68 COFOG, and consequently the GPC, is also used to help distinguish between expenditure by government on individual services and collective services. By convention, all government final consumption expenditures under each of the following headings are treated as expenditures on individual services, except for expenditures on general administration, regulation, research, etc.:

4 Education
5 Health
6 Social security and welfare
8 Recreation, sport and culture.

10.69 In addition, expenditures under the following subheadings should also be treated as individual when they are important:

7 Part of the provision of housing, part of the collection of household refuse
12 Part of the operation of transport systems.

10.70 Detailed estimates of government final consumption expenditure classified by purpose are available, as a general rule, from 1961-62.

Benchmark years

10.71 Annual estimates of GFCE are disaggregated by level of government. The level of government disaggregation is National (which is further split between defence and non-defence) and State and local, which are combined. The National level of government is defined to include Commonwealth plus government bodies that are considered to be jointly administered by the Commonwealth and State and local governments. Public universities are the only government bodies that are currently considered to be jointly administered.

10.72 The table below outlines the data sources and methods used in the estimation of benchmark years estimates for GFCE. It includes both the current price estimates and volume estimates.

Table 10.27 BENCHMARK YEARS ANNUAL GOVERNMENT FINAL CONSUMPTION EXPENDITURE

| Item | Comment |
|---|---|
| **Current price estimates** | Annual Government Finance Statistics (GFS) is the data source. It is obtained from the Department of Finance and Deregulation, State and Territory Treasuries, local government and universities.<br><br>The following adjustments are made to the GFS data:<br><br>• payroll taxes paid by government agencies to their State/Territory revenue office – a consolidation adjustment;<br>• FISIM;<br>• current expenditure on developing intellectual property products which is treated as gross fixed capital formation. The products include:<br>  • computer software development;<br>  • research and development; and<br>  • film and television production.<br>• consumption of fixed capital on intellectual property products – replace depreciation of these products from GFS.<br><br>GFS data are classified according to the General Purpose Classification (GPC). The GPC level data is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The GFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7.<br><br>The supply and use benchmark is disaggregated to National defence, National non-defence and State and local level. GFCE for each sector is derived using the quarterly data and the proportion of each sector to the total is applied to the supply and use benchmark. |
| **Volume estimates** | Current price estimates are price deflated using components of the Consumer Price Index, Wage Price Index and Producer Price Index. |

Latest year

10.73 GFCE data for the latest financial year (or latest two years for the June quarter in cat. no. 5206.0) is the sum of data reported for the four quarters for both current price estimates and chain volume measures.

10.74 The tables below outline the data sources and methods used in the estimation of latest year estimates for GFCE by level of government. They include both the current price estimates and volume estimates.

Table 10.28 LATEST YEAR ANNUAL GOVERNMENT FINAL CONSUMPTION EXPENDITURE—National defence

| Item | Comment |
|---|---|
| **Current price estimates** | Government Finance Statistics is the data source which provides data relating to defence. It is sourced from the Department of Finance and Deregulation.<br><br>The data obtained are for the expenditures on defence employees (i.e. wages and salaries and employer social contributions) and on other defence inputs (i.e. operating expenses such as rent, electricity, stationery, etc.) plus details of the value of sales of goods and services. The estimate for government expenditure on Financial Intermediation Services Indirectly Measured (FISIM) is included as part of the costs (i.e. intermediate consumption) of general government.<br><br>Consumption of fixed capital is used in place of the depreciation recorded in government accounts. Consumption of fixed capital is the preferred conceptual treatment as it is compiled on a current replacement basis rather than the historical cost basis used to compute depreciation allowances. It is obtained from the Perpetual Inventory Model (PIM).<br><br>Current expenditures paid for in-house development of intellectual property are not included as intermediate consumption. They are capitalised and included in gross fixed capital formation. |
| **Volume estimates** | Sum of the four quarters using components of the Consumer Price Index, Wage Price Index and Producer Price Index. |

Table 10.29 LATEST YEAR ANNUAL GOVERNMENT FINAL CONSUMPTION EXPENDITURE—National non-defence

| Item | Comment |
|---|---|
| **Current price estimates** | Government Finance Statistics is the data source. It is obtained from the Department of Finance and Deregulation. Public universities data are sourced from a survey of a sample of universities. Intellectual property products estimates are recorded as gross fixed capital formation in the ASNA.<br><br>The data obtained are for the expenditures by Commonwealth agencies (other than those classified to Defence) and by public universities on employees (i.e. wages and salaries and employer social contributions) and on other inputs (i.e. operating expenses such as rent, electricity, stationery, etc.) plus details of the value of sales of goods and services. The estimate for government expenditure on Financial Intermediation Services Indirectly Measured (FISIM) is included as part of the costs (i.e. intermediate consumption) of general government.<br><br>Consumption of fixed capital is used in place of the depreciation recorded in government accounts. Consumption of fixed capital is the preferred conceptual treatment as it is compiled on a current replacement basis rather than the historical cost basis used to compute depreciation allowances. It is obtained from the Perpetual Inventory Model (PIM). |

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| | Current expenditures paid for in-house development of intellectual property are not included as intermediate consumption. They are capitalised and included in gross fixed capital formation. |
| **Volume estimates** | Sum of the four quarters using components of the Consumer Price Index, Wage Price Index and Producer Price Index. |

Table 10.30 LATEST YEAR ANNUAL GOVERNMENT FINAL CONSUMPTION EXPENDITURE—State and local

| Item | Comment |
|---|---|
| **Current price estimates** | The State and Territory Treasuries provide the State and Territory level data. Local government data are sourced from annual Government Finance Statistics.<br><br>The data obtained are for the expenditures by State and local government agencies on employees (i.e. wages and salaries and employer social contributions) and on other inputs (i.e. operating expenses such as rent, electricity, stationery, etc.) plus details of the value of sales of goods and services. The estimate for government expenditure on Financial Intermediation Services Indirectly Measured (FISIM) is included as part of the costs (i.e. intermediate consumption) of general government.<br><br>Consumption of fixed capital is used in place of the depreciation recorded in government accounts. Consumption of fixed capital is the preferred conceptual treatment as it is compiled on a current replacement basis rather than the historical cost basis used to compute depreciation allowances. It is obtained from the Perpetual Inventory Model (PIM).<br><br>Current expenditures paid for in-house development of intellectual property are not included as intermediate consumption. They are capitalised and included in gross fixed capital formation. |
| **Volume estimates** | Sum of the four quarters using components of the Consumer Price Index, Wage Price Index and Producer Price Index. |

*Sources and methods – Quarterly*

10.75 Quarterly estimates of GFCE are disaggregated by the same levels of government as the annual benchmarks. The level of government disaggregation is National (which is further split between defence and non-defence) and State and local, which are combined. The National level of government is defined to include Commonwealth plus government bodies that are considered to be jointly administered by the Commonwealth and State and local governments. Public universities are the only government bodies that are currently considered to be jointly administered.

10.76 The tables below outline the data sources and methods used in the estimation of quarterly GFCE by level of government. They include both the current price estimates and volume estimates.

Table 10.31 QUARTERLY GOVERNMENT FINAL CONSUMPTION EXPENDITURE—National defence

| Item | Comment |
|---|---|
| **Current price estimates** | The quarterly Government Finance Statistics is the data source which provides data relating to expenditures on defence. It is sourced from the Department of Finance and Deregulation. It is used as an indicator which is applied to the annual benchmarks.<br><br>The data obtained are for the expenditures on defence employees (i.e. wages and salaries and employer social contributions) and on other defence inputs (i.e. operating expenses such as rent, electricity, stationery, etc.) plus details of the value of sales of goods and services. The estimate for government expenditure on Financial Intermediation Services Indirectly Measured (FISIM) is included as part of the costs (i.e. intermediate consumption) of general government.<br><br>Consumption of fixed capital is used in place of the depreciation recorded in government accounts. Consumption of fixed capital is the preferred conceptual treatment as it is compiled on a current replacement basis rather than the historical cost basis used to compute depreciation allowances. It is obtained from the Perpetual Inventory Model (PIM).<br><br>Current expenditures paid for in-house development of intellectual property are not included as intermediate consumption. They are capitalised and included in gross fixed capital formation. |
| **Volume estimates** | Current price estimates are price deflated using components of the Consumer Price Index, Wage Price Index and Producer Price Index. |

Table 10.32 QUARTERLY GOVERNMENT FINAL CONSUMPTION EXPENDITURE—National non-defence

| Item | Comment |
|---|---|
| **Current price estimates** | Quarterly data are directly sourced from the Department of Finance and Deregulation quarterly ledger. Data for universities are collected from a sample of approximately 22 public universities or just over 50 per cent of their population. Intellectual property products estimates are recorded as gross fixed capital formation in the ASNA.<br><br>The data obtained are for the expenditures by Commonwealth agencies (other than those classified to Defence) and by public universities on employees (i.e. wages and salaries and employer social contributions) and on other inputs (i.e. operating expenses such as rent, electricity, stationery, etc.) plus details of the value of sales of goods and services. The estimate for government expenditure on Financial Intermediation Services Indirectly Measured (FISIM) is included as part of the costs (i.e. intermediate consumption) of general government.<br><br>Consumption of fixed capital is used in place of the depreciation |

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| | recorded in government accounts. Consumption of fixed capital is the preferred conceptual treatment as it is compiled on a current replacement basis rather than the historical cost basis used to compute depreciation allowances. It is obtained from the Perpetual Inventory Model (PIM).<br><br>Current expenditures paid for in-house development of intellectual property are not included as intermediate consumption. They are capitalised and included in gross fixed capital formation. |
| **Volume estimates** | Current price estimates of the following components are either price deflated or quantity re-valued to obtain volume estimates. These are summed to obtain a total national non-defence GFCE estimate. |
| **Universities** | Universities estimates are quantity re-valued using the estimated growth in the number of students in the latest year. The growth is converted to quarterly estimates by applying a linear trend interpolation technique. |
| **Pharmaceuticals** | Pharmaceuticals estimates are price deflated using the CPI data for expenditure on pharmaceuticals. |
| **Health** | Health estimates are quantity re-valued using the estimated growth in medical services (from Medicare and hospital services data) performed in the latest year. The growth is converted to quarterly estimates by applying a linear trend interpolation technique. |
| **Redundancies** | Current price estimates of redundancy payments are sourced from the Department of Finance and Deregulation and allocated to Health, Education and all other according to the percentage share of these estimates in GFCE. Health and Education estimates are quantity revalued as above and all other is price deflated as below using components of the Consumer Price Index, Wage Price Index and Producer Price Index. |
| **Superannuation** | Superannuation estimates are price deflated using indexes compiled from the Wage Price Index. |
| **All other** | All other national Non-defence estimates are price deflated using an index compiled using components of the Consumer Price Index, Wage Price Index and Producer Price Index. |

Table 10.33 QUARTERLY GOVERNMENT FINAL CONSUMPTION EXPENDITURE—State and local

| Item | Comment |
|---|---|
| **Current price estimates** | The State and Territory Treasuries provide the State and Territory level data. The data comes from monthly and quarterly statements of receipts and expenditure which are compiled from agency based financial reporting. Local government data are sourced from a quarterly sample (approximately 20%) of local government authorities.<br><br>The data obtained are for the expenditures by State and local government agencies on employees (i.e. wages and salaries and employer social contributions) and on other inputs (i.e. operating expenses such as rent, electricity, stationery, etc.) plus details of the value of sales of goods and services. The estimate for government expenditure on Financial Intermediation Services Indirectly Measured (FISIM) is included as part of the costs (i.e. intermediate consumption) of general government.<br><br>Consumption of fixed capital is used in place of the depreciation recorded in government accounts. Consumption of fixed capital is the preferred conceptual treatment as it is compiled on a current |

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| | replacement basis rather than the historical cost basis used to compute depreciation allowances. It is obtained from the Perpetual Inventory Model (PIM).<br><br>Current expenditures paid for in-house development of intellectual property are not included as intermediate consumption. They are capitalised and included in gross fixed capital formation. |
| **Volume estimates** | Current price estimates of the following components are either price deflated or quantity re-valued to obtain volume estimates. These are summed to obtain a total State and local GFCE estimate. |
| **Health** | Health estimates are quantity re-valued using the estimated growth in medical services (from Medicare and hospital services data) performed in the latest year. The growth is converted to quarterly estimates by applying a linear trend interpolation technique. |
| **Education** | Education estimates are quantity re-valued using the estimated growth in the number of students in the latest year. The growth is converted to quarterly estimates by applying a linear trend interpolation technique. |
| **Redundancies** | Current price estimates if redundancy payments are sourced from State and Territory governments by State and allocated to Health, Education and all other according to the percentage share of these estimates in GFCE. Health and Education estimates are quantity revalued as above and all other is price deflated as below using components of the Consumer Price Index, Wage Price Index and Producer Price Index. |
| **Superannuation** | Superannuation estimates are price deflated using indexes compiled from Wage Price Index. |
| **All other** | All other State and local government estimates are price deflated using an index compiled using components of the Consumer Price Index, Wage Price Index and Producer Price Index. |

## Gross Fixed Capital Formation

### Gross capital formation

10.77 Gross capital formation refers to the gross additions to national wealth that result from three categories of investment:

1. gross fixed capital formation, measured by the total value of a producer's acquisitions, less disposals, of fixed assets during the accounting period;
2. changes in inventories, equal to the value of inventories acquired by an enterprise less the value of inventories disposed of during the accounting period; and
3. acquisitions less disposals of valuables.

10.78 Valuables are assets that are not used primarily for production or consumption, that do not deteriorate over time under normal conditions and that are acquired and held primarily as a store of value. Valuables consist of precious stones and metals (provided that they are not intended to be used as intermediate inputs into processes of production); paintings, sculptures, etc. recognised as works of art; antiques; and other valuables such as jewellery fashioned from precious stones and metals. At present, estimates of gross capital formation flowing from acquisitions less disposals of valuables are not included in Australia's national accounts.

10.79 Amounts paid for non-produced, non-financial assets such as land, subsoil assets and contracts, leases and licenses represent a transfer of wealth, not an addition to it. Therefore, although such expenditures are classified as being of a capital nature, and are included in the relevant capital accounts, they are not included in GFCF. However, costs associated with the transfer of ownership of such assets are included in GFCF.

10.80 Fixed capital formation estimates are shown on a 'gross' basis (i.e. deductions have not been made for the consumption of existing assets during the production process). However, the estimates are net of the sale of second-hand capital assets (only to non-residents and sales of used motor vehicles to households for non-business use) at the total level. However, the net sale of second-hand capital assets can be significant between sectors, such as government and private corporations, in the domestic economy.

### Gross fixed capital formation

#### *Concept*

10.81 Gross fixed capital formation (GFCF) is equal to the total value of a producer's acquisitions, less disposals, of fixed assets plus capital work done on own account during the accounting period plus certain additions to the value of non-produced assets realised by the productive activity of institutional units (e.g. land improvements). The latter include reclamation of land from the sea, clearance of forests to bring land into use for the first time, draining of marshes or irrigation of deserts, and prevention of flooding by erection of breakwaters, sea walls or flood barriers. These activities may result in the creation of new structures such as seawalls, flood barriers, dams, etc., that are not used directly in production but are constructed to make additional land available.

10.82 It is necessary to define what constitutes a fixed asset and what does not. All goods and services supplied to the economy by means of production, imports, or the disposal of produced assets must be used for exports, consumption (intermediate or final) or as part of capital formation. The boundary line between those products that are retained in the economy and are used for consumption and those products that are used for capital formation is known as the asset boundary. The asset boundary for produced assets consists of assets that have come into existence as outputs from processes of production, and that are themselves used repeatedly or continuously in other processes of production over periods of time longer than one year. Produced assets include intellectual property product which were previously termed "intangible fixed assets".

10.83 The fundamental point of distinction between intermediate consumption and gross fixed capital formation is whether commodities are used up during the course of a particular period or whether they yield benefits beyond that period. In the case of households as consumers, all expenditure except the purchase of dwellings is treated as final consumption expenditure, whether or not it yields future benefits. Therefore a

purchase of a motor vehicle by a household (but not by an associated unincorporated enterprise) is treated as final consumption expenditure, whereas the same purchase by a business would be classified to GFCF.

10.84 The acquisition of non-produced non-financial natural resource assets such as land, subsoil assets and natural timber tracts are not included in GFCF. However, capital costs associated with the extension or development of these assets are included, as are outlays on land reclamation and improvement. Expenditure associated with the improvement and alteration of durable assets which significantly extend their productive life is also included, but ordinary repairs and maintenance expenses are not.

10.85 GFCF is not recorded until the ownership of the fixed assets is transferred to the unit that intends to use them in production. For example, new machinery and equipment that has not yet been sold forms part of additions to inventories of finished goods held by the producers of the assets. Similarly, imported machinery and equipment is not recorded as GFCF until it is acquired by the unit that intends to use it. Assets which are purchased under a financial lease arrangement are treated as involving an effective change of ownership, and are therefore recorded as GFCF by the lessee, not the lessor.

10.86 Conventions have been adopted in the SNA in areas where boundary problems arise. For example, work put in place on structures (including dwellings, roads, dams, ports and other forms of construction) is considered to be GFCF of the unit for which the construction is being carried out, at the time the work is put in place. On the other hand, work on uncompleted heavy machinery and equipment (such as shipbuilding) during an accounting period is included as part of inventories of work-in-progress of the producer of the goods.

10.87 Acquisitions of new and existing assets are valued at purchasers' prices plus ownership transfer costs associated with the acquisition of fixed assets. Ownership transfer costs include professional charges or commissions incurred by the unit acquiring the asset, including fees paid to lawyers, architects, surveyors, engineers and valuers, and commissions paid to estate agents, auctioneers, etc., and all ownership transfer taxes payable by the acquiring unit. Consistent with this valuation method, disposals of fixed assets are valued at the prices payable by the units acquiring the assets, less any ownership transfers costs incurred by the units disposing of the assets.

### Capital formation of particular fixed assets

#### Weapons systems

10.88 Defence expenditure should be treated as GFCF as they meet the definition of assets and capital formation as they produce services for a period of more than one year and they are used continuously and repeatedly in production. Examples include the construction of buildings, roads, bridges, airfields, docks, etc. for military use. Transport equipment, communications equipment and computers are also to be capitalised. 2008 SNA has revised the treatment of expenditures on defence weapon delivery systems such as warships, submarines, fighter aircraft, bombers and tanks. They are now capitalised, however the weapons (i.e. ammunition, missiles, rockets, bombs, etc.) are still treated as military inventories. This treatment has been incorporated in ASNA.

#### Cultivated biological resources

10.89 Cultivated biological resources cover animal resources yielding repeat products and tree, crop and plant resources yielding repeat products whose natural growth and regeneration are under the direct control, responsibility and management of institutional units. In ASNA livestock is included in GFCF or work-in-progress (changes in inventories), depending on an animal's role in production. Breeding stock, dairy cattle and sheep raised for wool are capitalised; animals raised for food are treated as work-in-progress until slaughtered. The 2008 SNA recommendations are fully implemented for cattle and sheep. All sheep raised for wool, dairy cattle and own-account breeding stock (i.e. rams, ewes, bulls and cows), are included as acquisitions of fixed assets as they grow to maturity, and subtracted as disposals when eventually slaughtered or otherwise disposed of. Bulls produced for sale are included as work-in-progress until sold, at which time they are deducted from the inventories of the seller and included as acquisitions of fixed assets of the purchaser. All capitalised animals are added to the stock of finished goods when slaughtered. All other sheep and cattle are included as work-in-progress and output as they grow, and are converted to finished goods when slaughtered. It should be noted that the full range of animals is included in the level of fixed assets and inventories shown in the balance sheet of the ASNA, but it has not yet been possible to adopt a fully consistent treatment in the flow accounts for animals other than cattle and sheep.

10.90 Exceptional losses of animals due to major outbreaks of disease, contamination, drought, or other natural disasters are recorded in the other changes in the volume of assets account and not as disposals. Incidental losses of animals due to occasional deaths from natural causes form part of consumption of fixed capital.

10.91 The 2008 SNA (like its predecessor) recommends that orchard growth be included as capital formation of cultivated assets. The definition of orchard growth extends to all fruit and nut bearing plants such as trees, vines, bushes, shrubs etc. (i.e. any plant that can produce a marketable quantity of fruit for more than one year where the grower intends to obtain a future benefit from the sale of the fruits grown). In the ASNA orchard growth is treated as GFCF of a non-financial asset, in line with the 2008 SNA recommendations. Exceptional losses of orchards due to drought or other natural disasters such as gales or hurricanes are recorded in the other changes in the volume of assets account and not as disposals.

Research and development

10.92 A major change in 2008 SNA is the recognition of expenditure on R&D as capital formation and this recommendation has been implemented in ASNA. R&D consists of the value of expenditures on creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and use of this stock of knowledge to devise new applications. This does not extend to including human capital as assets. The value of R&D should be determined in terms of the economic benefits it is expected to provide in the future, including the provision of public services in the case of R&D acquired by government. In principle, R&D that does not provide an economic benefit to its owner does not constitute a fixed asset and should be treated as intermediate consumption.

10.93 In ASNA, strategic basic research, applied research and experimental development expenditures are capitalised for corporations, non-profit institutions and general government. Pure basic research expenditures are included only for corporations, as it is assumed pure basic research undertaken by general government and NPISHs is generally freely available and so should not be treated as capital formation. Exports of pure basic research will not result in capital expenditure in Australia.

10.94 R&D expenditure by the computer systems design and related services industry group is identifiable, and will be classified as R&D, while software R&D reported by other industries will be treated as capital expenditure on computer software. For practical purposes the ABS assumes that funders of R&D are the users and owners of the resulting R&D assets. In the Australian context more than 90 percent of business R&D assets are produced on own account. In the case of own account production the question of ownership does not arise, as the performer is also the funder, and is clearly the owner of the asset. Where a performer purchases R&D services from an outside supplier, it is assumed that those services are an intermediate input into own-account production of an R&D asset. Given the majority of R&D is undertaken on own account it is valued at cost. Data on R&D expenditure in conjunction with information on the life of patented R&D discoveries are used to produce estimates of the stock of R&D assets.

Computer software and databases

10.95 The 2008 SNA recommends treating all databases holding data with a useful life of more than one year as fixed assets whether the databases are created on own account or for sale as well as separating computer software and databases as two distinct asset types. It also provided further clarification on the valuation of computer software and databases (i.e. computer software and databases developed on own account should be valued on a sum of costs basis). The value of the software component of the database, the database management system, is recorded as a software asset. Computer software and databases for sale should be valued at their market prices.

10.96 The ASNA does not separately identify databases from computer software. The valuation treatment in ASNA is consistent with the 2008 SNA treatment, however it is not clear that the entire scope of database production, particularly the updating of databases, is being captured in practice. Further work is being undertaken to ensure the activity is measured completely.

Mineral and petroleum exploration

10.97 The ASNA treatment of expenditures on mineral and petroleum exploration is in line with 2008 SNA recommendations (i.e. expenditures on mineral and petroleum exploration are capitalised rather than being treated as intermediate consumption). Whether they are successful or not, they are needed to acquire new reserves and are, therefore, all classified as GFCF. They are valued at market prices if purchased or at the sum of costs plus an appropriate mark up if undertaken on own account. However, because the market price is not usually available, the valuation is the present value of future receipts for resource rent.

10.98 Mineral and petroleum exploration covers expenditure on exploration for petroleum (including oil shale), metallic minerals, construction materials, gemstones, and other non-metallic minerals less expenditure on successful bids for offshore petroleum leases (which is regarded as intermediate expenditure, not capital formation). Exploration expenditure covers all exploration activity undertaken on land and in Australia's territorial waters and the continental shelf over which Australia exercises exclusive rights. It includes

expenditure on aerial surveys (including Landsat photographs), general surveys, report writing, map preparation and other activities indirectly attributable to exploration.

Ownership transfer costs

10.99 2008 SNA recommends that the cost of ownership transfer is written off over the period during which the purchaser expects to hold the asset. Therefore the costs of ownership transfers will be entirely depreciated when the asset is resold. ASNA has implemented this recommendation, which is a change to the previous treatment, whereby ownership transfer costs were written off in the same period in which they arose.

10.100 Ownership transfer costs consist of fees paid to lawyers, fees and commissions paid to real estate agents and auctioneers, stamp duty, Title Office charges and local government charges. Ownership transfer costs in the ASNA relate to dwellings, non-dwelling construction, and unoccupied land.

*Classification of fixed assets*

10.101 GFCF is classified by type of asset. There is substantial diversity in the different types of GFCF that may take place. A brief description of asset types used in the ASNA is presented below.

10.102 Acquisitions, less disposals, of new or existing produced fixed assets, are subdivided by type of asset:

- *Dwellings* comprises houses and other dwellings such as flats, home units, villa units, duplexes, mobile homes, caravans, etc. used entirely as the principal residences of households. Dwellings can also include residential dwelling buildings for communities such as retirement homes, military personnel, etc. Expenditure on the construction of hostel-type accommodation, prisons and motels is included in non-dwelling construction as this is not the primary residence for households. Also included are capitalised services, such as design and architectural fees, etc. In the ASNA, dwellings consist of two subcomponents:
    - New and used dwellings; and
    - Alterations and additions – comprises construction activity carried out on existing dwellings. This includes adding to or diminishing floor area, altering the structural design of dwellings and affixing rigid components which are integral to the functioning of the dwelling.
- *Ownership transfer costs* comprise the various fees which are incurred by either the buyer or seller of real estate, namely legal fees on transfer, real estate sales commissions, stamp duties on transfer and other government charges (e.g. Water boards, Land Tax Office, etc). Costs associated with acquiring and disposing of assets may be described as costs of ownership transfer. The value of work performed 'in house' (e.g. conveyancing performed by an enterprise's own legal staff) is excluded. It should be noted that estimates of ownership transfer costs are not separately identified for the public sector. In any event, transfer expenses of public authorities are relatively insignificant because the majority of public authorities are exempt from stamp duty, they frequently use their own staff to undertake the associated legal work and they make only limited use of real estate agents.
- *Non-dwelling construction* comprises such assets as industrial, commercial, and non-dwelling residential buildings; water and sewerage installations; lifts, heating, ventilating and similar equipment forming an integral part of buildings and structures; land development; roads; bridges; wharves; harbours; railway lines; pipelines; and power and telephone lines. The category also includes expenditures that lead to major improvements in the quantity, quality or productivity of land, or prevent its deterioration. Also included are capitalised services, such as design and architectural fees, etc.
- *Machinery and equipment* include vehicles; aircrafts; ships; electrical apparatus; office equipment; furniture, fixtures and fittings not forming an integral part of buildings or structures; durable containers; special tooling, etc. In the ASNA machinery and equipment is presented for two sub-components:
    - New machinery and equipment; and
    - Net purchases of second-hand assets.

- *Cultivated biological resources* cover livestock (cattle and sheep) that are used repeatedly or continuously to produce products such as milk, wool etc., or are used as breeding stock and tree, crop and plant resources yielding repeat products whose natural growth and regeneration are under the direct control, responsibility and management of institutional units . Gross fixed capital formation in livestock is equal to the total value of all mature animals and immature animals produced on own account by users of the livestock, less the value of their disposals. Disposals consist of animals sold or otherwise disposed of, including those sold for slaughter, plus those animals slaughtered by their owners.
- *Intellectual property products* are as a result of creative activity, research and development, investigation or innovations leading to knowledge that the developers can market or use for their own benefit. These are produced fixed assets. Acquisitions, less disposals, of new and existing intellectual property products are subdivided by type of asset:
    - *Research and development* comprising the value of expenditures on creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and use of this stock of knowledge to devise new applications.
    - *Mineral and petroleum exploration* consisting of the value of expenditures on exploration for petroleum and natural gas and for non-petroleum deposits and subsequent evaluation of the discoveries made.
    - *Computer software* covering both purchased software and software developed in-house. Gross fixed capital formation also includes the purchase or development of databases that the enterprise expects to use in production over a period of more than one year. However, the ASNA does not separately identify databases from computer software as recommended by the 2008 SNA.
    - *Entertainment, literary and artistic originals* comprising the originals of films, sound recordings, manuscripts, tapes, models, etc. on which drama performances, sporting events, literary and artistic output etc. are recorded or embodied.

*Sources and methods – Annual*

Benchmark years

10.103 Annual estimates of GFCF are primarily disaggregated between the private and public sectors. The private sector GFCF is presented by type of asset. The public sector GFCF is initially split according to institutional sector (i.e. public corporations and general government) by type of asset and then level of government by type of asset. The level of government disaggregation is National (which is further split between defence and non-defence) and State and local, which are combined.

10.104 The following outlines the adjustments that are made to the public sector estimates to ensure consistency with the 2008 SNA:

- Capitalised computer software— is modelled based on current expenditure of wages and non-wage expenses by government and purchases of software (obtained from Government Finance Statistics).
- Mineral exploration— is obtained from *Mineral and Petroleum Exploration, Australia* (cat. no. 8412.). Since 1988-89 the value has been zero as governments are no longer directly involved in mineral exploration activities.
- Artistic originals— are based on data obtained from Annual Reports for public broadcasting networks.
- Research and development expenditure— is based on *Research and Experimental Development, Government and Private Non-Profit Organisations, Australia* (cat. no. 8109.0) and *Research and Experimental Development, Higher Education Organisations, Australia* (cat. no. 8111.0).

10.105 The tables below outline the data sources and methods used in the estimation of annual GFCF by asset type for the private sector and level of government for the public sector. They include both the current price estimates and volume estimates.

Table 10.34 ANNUAL PRIVATE GROSS FIXED CAPITAL FORMATION—Dwellings

| Item | Comment |
|---|---|
| **Description** | Gross fixed capital formation (GFCF) in dwellings consists of the value of acquisitions of new and existing (used) dwellings less the value of disposals of existing dwellings.<br><br>It also includes the value of dwellings created by the conversion of existing non-dwelling buildings to dwellings, and the value of alterations and additions to existing dwellings.<br><br>Dwellings are buildings, or designated parts of buildings, that are used entirely or primarily as residences, including any associated structures regarded as fixed assets, such as garages, and all permanent fixtures customarily installed in residences. Houseboats, barges, mobile homes and caravans used as principal residences of households are also included and are regarded as fixed assets, as are public monuments identified primarily as dwellings.<br><br>The costs of clearing and preparing the site for construction are part of the costs of new dwellings (and non-dwelling construction) and are therefore included in the value of the buildings.<br><br>Incomplete dwellings are included to the extent that the ultimate user is deemed to have taken ownership, either because the construction is on own-account or as evidenced by the existence of a contract of sale or purchase.<br><br>All dwellings must give rise to housing services that are included within the production boundary, regardless of whether the dwellings are occupied by the owners or rented on the market. |
| **Current price estimates** | The Construction Industry Survey (CIS) and Household Expenditure Survey (HES) are used to periodically set annual levels for the benchmark years. In the off years of CIS and HES, the Building Activity Survey (BACS) growth rates are used to move dwellings estimates forward.<br><br>GFCF on dwellings is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | The current price estimates are deflated using quarterly price indexes, which have been summed to form the annual estimate. These price indexes include but are not limited to the Articles Produced by the Manufacturing Industry (APMI), Materials Used by the Manufacturing Industry (MUMI) and the Consumer Price Index. |

Table 10.35 ANNUAL PRIVATE GROSS FIXED CAPITAL FORMATION—Non-dwelling construction

| Item | Comment |
|---|---|
| **Description** | Gross fixed capital formation (GFCF) in non-dwelling construction is recorded as the value of the acquisitions of new and existing non-dwelling buildings and structures, less the value of the disposals of existing non-dwelling buildings and structures, and the value of alterations and additions to existing non-dwelling buildings and structures.<br><br>Non-dwelling construction comprises three components: new building, new engineering construction and net purchases of second-hand assets.<br><br>• New building consists of newly-constructed buildings that are not designated as dwellings. Fixtures, facilities and equipment that are integral parts of the structures are included. Examples of non-residential buildings include warehouses and industrial buildings, commercial buildings, buildings for public entertainment, hotels, restaurants, schools, hospitals, prisons etc.;<br><br>• New engineering construction includes civil engineering works, such as highways, streets, roads, railways and airfield runways; bridges, elevated highways, tunnels and subways; waterways, harbours, dams and other waterworks; long-distance pipelines, communication and power lines; local pipelines and cables, ancillary works; constructions for mining and manufacture; and constructions of sport and recreation facilities; and<br><br>• Net purchases of second-hand assets consist of the purchase and sale of existing non-dwelling buildings and structures.<br><br>It should be noted that ASNA's estimates for non-dwelling construction excludes the value of ownership transfer costs (OTC). These costs, associated with the ownership transfer of an asset, are collected in OTC as a separate line item in Private GFCF. |
| **Current price estimates** | The Construction Industry Survey (CIS) is used to periodically set annual levels for benchmark years. In the off year of CIS, Building Activity Survey (BACS) and Engineering Construction Survey (ECS) growth rates are used to move non-dwelling construction estimates forward.<br><br>GFCF on non-dwelling construction is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | The current price estimates are deflated using quarterly price indexes, which have been summed to form an annual. These price indexes include but are not limited to the Articles Produced by the Manufacturing Industry (APMI) and Materials Used by the Manufacturing Industry (MUMI) for roads and bridges. |

Table 10.36 ANNUAL PRIVATE GROSS FIXED CAPITAL FORMATION—Machinery and equipment

| Item | Comment |
|---|---|
| **Description** | Gross fixed capital formation (GFCF) for machinery and equipment is recorded as the value of the acquisitions of new and existing machinery and equipment, less the value of the disposals of existing machinery and equipment.<br><br>Machinery and equipment is classified according to six asset types:<br>• Computers and peripherals;<br>• Electrical and electronic equipment;<br>• Industrial machinery and equipment;<br>• Motor vehicles;<br>• Other transport equipment; and<br>• Other machinery and equipment.<br><br>ASNA's machinery and equipment mirrors the 2008 SNA concept.<br><br>In the ASNA, private gross fixed capital formation for machinery and equipment is presented with two sub-components: new machinery and equipment and net purchases of second-hand assets. |
| **Current price estimates** | Prior to 1994-95, estimates are compiled using statistics of depreciable assets available from the Australian Taxation Office (ATO).<br><br>The following adjustments are made:<br>• taking account of the effects of the special taxation provisions applied to the mining, finance and agricultural industries and for those cases where there is a difference between when expenditure on plant can be recorded for tax purposes and when expenditure is actually incurred;<br>• off-June year reporting; and<br>• late taxation returns by companies and unincorporated businesses and for organisations (e.g. non-profit organisations serving households) which, due to the nature of their operations are not subject to taxation.<br><br>From 1994-95, the source of these data is the Economic Activity Survey which covers most large businesses in the economy. For the smaller business ATO data is used.<br><br>Data are compiled separately for institutional sector and industry providing the elemental detail required by the Perpetual Inventory Model.<br><br>The following adjustments are made;<br>• financial leases are accounted for in the industry using the assets rather than the industry legally owning them (generally the finance industry); and<br>• net effect of assets leased to or from the public sector<br><br>These adjustments are made using data on net assets acquired under financial lease agreements collected from individual public non-financial corporations and public financial corporations.<br><br>At the institutional sector by industry level, significant adjustments are required to reallocate gross fixed capital formation from the financial corporations sector to the non-financial corporations sector and the household unincorporated enterprises sector; and from the finance industry to other industries. Indicators for these adjustments includes data from the quarterly Survey of New Capital Expenditure and from *Lending Finance, Australia* (cat. no. 5671.0). |

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|---|---|
| | GFCF on machinery and equipment is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | The current price estimates are deflated at the asset level, i.e. computers and peripherals, electrical and electronic equipment, industrial machinery and equipment, motor vehicles, other transport equipment and other machinery and equipment.<br><br>A number of price indexes are used some of which include, but are not limited to the Consumer Price Index, the Articles Produced by the Manufacturing Industry (APMI), the Materials Used by the Manufacturing Industry (MUMI) and the Import Price Index. |

Table 10.37 ANNUAL PRIVATE GROSS FIXED CAPITAL FORMATION—Cultivated biological resources

| Item | Comment |
|---|---|
| **Description** | 2008 SNA defines cultivated biological resources as animal resources (livestock) and tree, crop and plant resources (orchard growth) yielding repeat products whose natural growth and regeneration are under the direct control, responsibility and management of an institutional unit.<br><br>*Livestock* includes breeding stocks, dairy cattle, draft animals, sheep or other animals used for wool production and animals used for transportation, racing or entertainment as well as aquatic resources which are maintained for controlled reproduction.<br><br>*Orchard growth* includes trees (including vines and shrubs) cultivated for fruits and nuts, for sap and resin and for bark and leaf products.<br><br>GFCF for *livestock* is measured by the total value of all mature animals, and immature animals produced on own account, acquired by users of the livestock less the value of their disposal. Disposals consist of animals sold or otherwise disposed of, including those sold for slaughter, plus those animals slaughtered by their owners. Exceptional losses of animals due to major outbreaks of disease, contamination, drought, or other natural disasters are recorded in the Other changes in the volume of assets account and not as disposals. Incidental losses of animals due to occasional deaths from natural causes form part of consumption of fixed capital.<br><br>GFCF for *orchard growth* consists of the value of the acquisitions less disposals of mature trees, shrubs, etc., including acquisitions of immature trees, shrubs, etc., produced on own account. Disposals consist of trees, shrubs, etc., sold or otherwise transferred to other units plus those cut down before the end of their service lives. Disposals do not include exceptional losses of trees due to drought or other natural disasters such as gales or hurricanes, these being recorded in the Other |

changes in the volume of assets account.

**Livestock**

**Current price estimates**

Estimates of the value of sheep and cattle used to produce products such as wool and milk, or for breeding, are included in capital formation. For earlier periods, 1994-95 till 1999-2000, a primary source of data was the annual Agricultural Commodity Survey conducted by the ABS, which provided the number of animals in major livestock categories. Results from the survey were published in *Agriculture, Australia* (cat. no. 7113.0). In subsequent years, data for capital formation in cultivated biological resources is obtained from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) which is revised during the March quarter each year following the release of the ABS publication *Value of Agricultural Commodities Produced, Australia* (cat. no. 7503.0).

Calculation of sheep and cattle numbers also relies on slaughtering and exports quarterly data from *Livestock Products, Australia* (cat. no. 7215.0). Data on acquisition and disposal prices of other animals are calculated using the *Agriculture Commodities* publication from ABARES. Values for sheep and cattle are estimated by multiplying the number of animals by an average price per head.

**Volume estimates**

Annual volume estimates of gross fixed capital formation in the prices of the previous year are calculated by subtracting disposals from acquisitions. These estimates are then aggregated to form chain volume estimates of total livestock for each state and Australia.

**Orchard growth**

**Current price estimates**

Data for the number of trees and hectares of vines are available annually from the ABS publication *Agricultural Commodities* (cat. no. 7121.0). The current price value is derived by applying average costs incurred in the planting and growing of orchards to this data.

**Volume estimates**

Volume estimates are derived from data for the number of trees and hectares of vines available annually from the ABS publication *Agricultural Commodities* (cat. no. 7121.0).

**Total cultivated biological resources**

**Current prices**

The total current price estimate of cultivated biological resources is the sum of the livestock and orchard growth estimates.

GFCF on cultivated biological resources is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

The total volume estimate of cultivated biological resources is the sum of the livestock and orchard growth estimates.

Table 10.38 ANNUAL PRIVATE GROSS FIXED CAPITAL FORMATION—Intellectual property products

| Item | Comment |
|---|---|
| **Research and development** | |
| **Description** | Gross fixed capital formation (GFCF) of R&D, as defined in 2008 SNA, consists of the value of expenditures on creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and use of this stock of knowledge to devise new applications. This does not, however, include human capital as assets within the SNA. It should also be recognised that R&D products are very heterogeneous and not all R&D products are fixed assets and hence their classification should be determined on the economic benefit they are expected to provide in the future. In other words, R&D that does not provide an economic benefit to its owner does not constitute a fixed asset and should be treated as intermediate consumption.<br><br>The nature of R&D poses measurement challenges because R&D products are very heterogeneous and not all R&D products are sold in the market. The 2008 SNA recommends that the output of R&D should be valued at market prices if purchased (outsourced) or as the sum of total production costs plus an appropriate mark-up representing the costs of fixed assets used in production if undertaken on own account. R&D undertaken by specialised commercial research laboratories or institutes is valued by receipts from sales, contracts, commissions, fees, etc. R&D undertaken by government units, universities, non-profit research institutes, etc. is non-market production and should be valued on the basis of the total costs incurred excluding a return to capital used.<br><br>The ASNA's treatment of R&D requires a fundamental distinction between R&D services and own account R&D.<br><br>The R&D services refer to market transactions in R&D as suggested in the 2008 SNA reference to 'specialized commercial research laboratories or institutes'. The output of these units includes the sale of R&D and is therefore considered other non-market production and hence valued as suggested in 2008 SNA (at the cost of production).<br><br>The own account R&D refers to production or R&D undertaken on own account and consists of:<br>• Production of R&D by market producers on own account. For example consider a manufacturing unit producing computer screens and also undertaking R&D to improve methods for computer screen production. This unit will be classified by ANZSIC06 to the Manufacturing Division (where computer screens are primary) and will have output of both computer screens and own account R&D.<br>• R&D undertaken by non-market units (either primary production, secondary production or own account).<br><br>All output and GFCF of own account R&D is considered to be non-market production and is valued by summing the total production costs. It is also important to note that these costs include intermediate consumption of the R&D product and can be deducted from the GFCF accordingly. |
| **Current price estimates** | Annual estimates for both own account R&D expenditure and R&D undertaken by other institutions are derived from the Survey of Research and Experimental Development published in *Research and Experimental Development, Businesses, Australia* (cat. no. 8104.0), *Research and Experimental Development, Government and Private Non-Profit Organisations, Australia* (cat. no. 8109.0 *), and Research and Experimental Development, Higher Education Organisations, Australia* |

(cat. no. 8111.0). These publications provide datasets classified by both sector and type of research. The main dataset for the R&D series is calculated as the sum of labour costs and other expenditure.

Estimates of imports of R&D are obtained from *Balance of Payments and International Investment Position, Australia* (cat. no. 5302.0), which are directly collected through the Survey of International Trade in Services.

GFCF on R&D is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

The volume of capital expenditure on R&D is calculated by deflating the cost based expenditure values. These current price estimates are deflated using price indexes for labour inputs and other current expenditure used as inputs into the R&D products.

**Mineral and petroleum exploration**

**Description**

Mineral and petroleum exploration is the value of expenditures on exploration for petroleum and natural gas and for non-petroleum deposits and subsequent evaluation of the discoveries made. Expenditures on mineral exploration are not treated as intermediate consumption. Whether they are successful or not, they are needed to acquire new reserves and are, therefore, all classified as gross fixed capital formation (GFCF).

This item covers expenditure on exploration for petroleum (including oil shale), metallic minerals, construction materials, gemstones, and other non-metallic minerals less expenditure on successful bids for offshore petroleum leases (which is regarded as intermediate consumption, not capital formation).

Exploration expenditure covers all exploration activity undertaken on land and in Australia's territorial waters and the continental shelf over which Australia exercises exclusive rights. It includes pre-licence costs, licence and acquisition costs, appraisal costs, expenditure on aerial surveys, (including Landsat photographs), general surveys, report writing, map preparation and other activities indirectly attributable to exploration.

**Current price estimates**

Data on exploration by commodity (other than for petroleum) for the period 1948–49 to 1964–65 were largely based on data compiled by the Bureau of Resource Sciences. Data on mineral exploration expenditure from 1965–66 are obtained from *Mineral and Petroleum Exploration, Australia* (cat. no. 8412.0.). Data for expenditure on successful bids for offshore petroleum leases are obtained from the Department of Industry, Science and Resources annually.

Annual estimates are obtained by summation of the quarterly series.

GFCF on mineral and petroleum exploration is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then

aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Annual data for mineral and petroleum exploration are derived by summing the four quarters of mineral and petroleum exploration estimates obtained from the ABS publication *Mineral and Petroleum Exploration, Australia* (cat. no. 8412.0.).

**Computer software**
**Description**

Computer software consists of computer programs, program descriptions and supporting materials for both systems and applications software.

GFCF in computer software can include both the initial in-house development and subsequent extensions of software as well as software purchased on the market.

Software purchased on the market, which is valued at purchasers' prices, includes both products purchased 'off the shelf' and customised software designed by a specialist for a specific customer. Software developed in-house is valued at its estimated basic price or at its cost of production if it is not possible to estimate the basic price.

**Current price estimates**

Estimates from *Australian National Accounts Information and Communication Technology Satellite Account* (cat. no. 5259.0) have been incorporated into the ASNA for financial year 2002-03. Estimates for subsequent financial years are derived as follows:

- 'Customised' and 'In House' software via linear trend interpolation; and
- 'Packaged' software uses imports of computer software as an indicator.

GFCF on computer software is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

The current price estimates are deflated using quarterly price indexes, which have been summed to form an annual. The main price index used is the Articles Produced by the Manufacturing Industry (APMI).

**Entertainment, literary and artistic originals**

**Description**

This item covers the production of originals of films, television programs, music products, and books. 2008 SNA describes the production of entertainment, literary and artistic originals as a two-stage process of which the first stage is the production of the original and the second stage the production and use of copies of the original.

**Current price estimates**

Annual estimates are derived as the sum of the following components:

- *Film and independent television* includes master tapes of feature films and independent television drama and documentaries. Capital formation is calculated as the present value of expected future income flows generated from the originals. These flows are discounted to derive the present value of film and television income in any given year. For years from 1988-89 onwards, estimates are derived from data supplied by the Australian Film Finance Corporation. Estimates for earlier years are based on data provided by the Australian Film Commission and the Australian Film Development Corporation. Preliminary estimates for the latest years are based on production and royalty income data from the Australian Film Finance Corporation.
- *Television (own-account)* includes in-house production of programs classified as artistic originals, i.e. drama, sporting events and documentaries, by public and private television broadcasters. Capital formation is estimated from data on the value of artistic original productions made specifically for television from *Television, Film and Video Production and Post-Production Services*, *Australia* (cat. no. 8679.0), and Australian Broadcasting Authority Broadcasting Financial Results. Estimates for earlier years are based on data supplied by the Australian Film Commission and the Australian Film Finance Corporation.
- *Recorded music* includes master tapes owned by recording companies as used in the production of vinyl records, CDs and cassettes. Capital formation is estimated using a production cost approach. Budgets allocated to develop originals are indicative of expected future returns from those originals. Data on Australian sales by units for each category are obtained from the Australian Recording Industry Association (ARIA) Yearbook, and ARIA itself. Data on average production costs for each category were obtained from a sample of major record companies. These data were used to estimate current values for each category of originals for the music industry. These data were also used, in conjunction with the CPI data and assumptions about economies of scale, to generate historical estimates of values for each category. Preliminary estimates for the latest years are based on production and royalty income data from ARIA.
- *Music publishing* covers original musical works produced. Capital formation is estimated by using a market transactions approach. The advance a publisher pays a songwriter or composer on signing best describes the expected future return that the publisher hopes to receive from exploitation of the right assigned to them to use the artistic original, plus the publisher's share of the expected royalties. Data on capitalised advances for 1995–96 were obtained from *Business of Music, Australia* (cat. no. 4143.0) and used in conjunction with assumptions about the expected royalties to yield the market price of the original musical works.
- *Literary works* covers original manuscripts of books. Capital formation is estimated by a market transactions approach. The lump-sum payment a publisher pays an author is indicative of future benefits the publisher hopes to receive

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| | from publishing the literary work. Data on lump-sum payments to Australian authors for Australian literary works were obtained from *Book Publishers, Australia* (cat. no. 1363.0). Comparative financial data for the period 2001-02 to 2003-04 were available from the Book Retailers' Survey (ABS 2005) (*Arts and Culture in Australia: A Statistical* Overview (cat. no. 4172.0)). |
| | GFCF on entertainment, literary and artistic originals is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | The current price estimates are deflated using quarterly price indexes, which have been summed to form an annual. These price indexes include but are not limited to the Articles Produced by the Manufacturing Industry (APMI), the Producer Price Indexes and the Consumer Price Index. |

Table 10.39 ANNUAL PRIVATE GROSS FIXED CAPITAL FORMATION—Ownership transfer costs

| Item | Comment |
|---|---|
| **Description** | Acquisitions of new assets are valued at actual or estimated purchasers' prices plus the associated costs of ownership transfer incurred by units acquiring the assets. Similarly, acquisitions of existing assets are valued at the actual or estimated prices payable to their previous owners plus the associated costs of ownership transfer incurred by the units acquiring the assets. Ownership transfer costs consist of the following components:<br>• fees paid to lawyers;<br>• fees and commissions paid to real estate agents, auctioneers, architects, surveyors, engineers and valuers;<br>• stamp duty;<br>• Titles Office charges; and<br>• local government charges.<br><br>Ownership transfer costs in the ASNA relate to dwellings, non-dwelling construction, and unoccupied land. |
| **Current price estimates** | Annual estimates for real estate agents' commissions and lawyers' conveyancing fees are based on taxation statistics of total business incomes for these industries and the results from the periodic surveys published in *Real Estate Agents Industry, Australia* (cat. no. 8663.0), *Legal Services, Australia* (cat. no. 8667.0), *Accounting Practices, Australia* (cat. no. 8668.0) and *Legal and Accounting Services, Australia* (cat. no. 8678.0).<br><br>The ABS surveys provide an estimate of the proportion of total business income derived from the transfer of real estate, together with an allocation by institutional sector of the value of work done. The resulting |

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| | ratios are applied to taxation statistics of total business income.<br><br>The first ABS data were collected in respect of 1982–83. Major ABS surveys in respect of real estate agents and legal services were conducted in 1987–88, 1992–93, 1995–96 and 1998–99, and more recently, real estate agents in 2002-03 and legal services in 2001-02 and 2007-08. In other years, income from real estate transfers is estimated using a composite indicator which includes movements in the volume of sales, average sale prices and tables of scheduled fees.<br><br>Stamp duties estimates are based on data obtained from various State stamp duty offices (NSW, VIC, QLD, SA, WA, TAS, NT and ACT). Charges levied by the various Titles Offices for registration of titles are derived mainly from Budget Papers, while local government charges made for various searches are derived using average unit charges multiplied by the number of transfers.<br><br>GFCF on ownership transfer costs is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Volumes are obtained by quantity revaluing the current price estimates using, title transfers data obtained from the State Titles Offices and Treasuries. |

Table 10.40 ANNUAL PUBLIC GROSS FIXED CAPITAL FORMATION—Public corporations

| Item | Comment |
|---|---|
| **Commonwealth**<br>**Current price estimates** | The annual data source is the Government Finance Statistics which are compiled from the audited annual returns from the Commonwealth Department of Finance and Deregulation for both general government and public corporations.<br><br>Adjustments are made to deduct current expenditure on wages, salaries and consumables to produce intellectual property products on own account which are treated as gross fixed capital formation. The intellectual property products included are as follows:<br><br>• computer software;<br>• mineral exploration;<br>• artistic originals; and<br>• research and development.<br><br>The data collected is by the following assets types:<br><br>• dwellings;<br>• non-dwelling construction;<br>• machinery and equipment; and |

- intellectual property products as listed above.

Amounts for new and second-hand purchases or disposals are determined in order to derive net second-hand purchases. This allows for the identification of private net sector purchases of fixed capital assets from the public sector which are used in the compilation of private sector gross fixed capital formation.

GFCF undertaken by Commonwealth public corporations is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Derived from deflated quarterly current price estimates.

**State and local**
**Current price estimates**

The annual data source is the Government Finance Statistics which contains the audited annual returns from the State and Territory Treasuries and all local governments.

Adjustments are made to deduct current expenditure on wages, salaries and consumables to produce intellectual property products on own account which are treated as gross fixed capital formation. The intellectual property products included are as follows:

- computer software; and
- research and development.

The data collected is by the following assets types:

- dwellings;
- non-dwelling construction;
- machinery and equipment; and
- intellectual property products as listed above.

Amounts for new and second-hand purchases or disposals are determined in order to derive net second-hand purchases. This allows for the identification of private net sector purchases of fixed capital assets from the public sector which are used in the compilation of private sector gross fixed capital formation.

GFCF undertaken by State and local public corporations is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use.

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| | The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Derived from deflated quarterly current price estimates. |

Table 10.41 ANNUAL PUBLIC GROSS FIXED CAPITAL FORMATION—General government

| Item | Comment |
|---|---|
| **National—defence** | |
| **Current price estimates** | The annual data source is the Government Finance Statistics which contains the audited annual returns from the Commonwealth Department of Finance and Deregulation.<br><br>Adjustments are made to deduct current expenditure on wages, salaries and consumables to produce intellectual property products on own account which are treated as gross fixed capital formation. The intellectual property products included are as follows:<br><br>• computer software; and<br>• research and development.<br><br>The data collected is by the following assets types:<br><br>• defence weapons systems;<br>• dwellings;<br>• non-dwelling construction;<br>• machinery and equipment; and<br>• intellectual property products as listed above.<br><br>Amounts for new and second-hand purchases or disposals are determined in order to derive net second-hand purchases. This allows for the identification of private net sector purchases of capital from the public sector which are used in the compilation of private sector gross fixed capital formation.<br><br>GFCF undertaken by National defence is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Derived from deflated quarterly current price estimates. |
| **National—non-defence** | |
| **Current price estimates** | The annual data source is the Government Finance Statistics which contains the audited annual returns from the Commonwealth Department of Finance and Deregulation and public universities. |

Adjustments are made to deduct current expenditure on wages, salaries and consumables to produce intellectual property products on own account which are treated as gross fixed capital formation. The intellectual property products included are as follows:

- computer software;
- mineral exploration;
- artistic originals; and
- research and development.

The data collected is by the following assets types:

- dwellings;
- non-dwelling construction;
- machinery and equipment; and
- intellectual property products as listed above.

Amounts for new and second-hand purchases or disposals are determined in order to derive net second-hand purchases. This allows for the identification of private net sector purchases of capital from the public sector which are used in the compilation of private sector gross fixed capital formation.

GFCF undertaken by National non-defence is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.

**Supply and Use balancing process**

The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.

For more information on the product flow method refer to Chapter 7.

**Volume estimates**

Derived from deflated quarterly current price estimates.

**State and local**
**Current price estimates**

The annual data source is the Government Finance Statistics which contains the audited annual returns from the State and Territory Treasuries and all local governments.

Adjustments are made to deduct current expenditure on wages, salaries and consumables to produce intellectual property products on own account which are treated as gross fixed capital formation. The intellectual property products included are as follows:

- computer software; and
- research and development.

The data collected is by the following assets types:

- dwellings;
- non-dwelling construction;
- machinery and equipment; and
- intellectual property products as listed above.

Amounts for new and second-hand purchases or disposals are determined in order to derive net second-hand purchases. This allows

| | |
|---|---|
| | for the identification of private net sector purchases of capital from the public sector which are used in the compilation of private sector gross fixed capital formation.<br><br>GFCF undertaken by State and local is mapped to the Input Output Product Classification (IOPC) level. The IOPC level is then aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The GFCF estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial GFCF estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Volume estimates** | Derived from deflated quarterly current price estimates. |

Latest year

10.106 Public and private gross fixed capital formation (GFCF) data for the latest financial year is the sum of data reported for the four quarters for both current price estimates and chain volume measures.

*Sources and methods – Quarterly*

10.107 Quarterly estimates of gross fixed capital formation (GFCF) are primarily disaggregated between the private and public sectors. The private sector GFCF is presented by type of asset. The public sector GFCF is initially split by institutional sector (i.e. public corporations and general government) and then by level of government. The level of government disaggregation is National (which is further split between defence and non-defence) and State and local, which are combined.

10.108 The adjustments that are made to the public sector annual estimates to ensure consistency with 2008 SNA are also applied to the quarterly estimates.

10.109 The tables below outline the data sources and methods used in the estimation of quarterly GFCF by asset type for the private sector and level of government for the public sector. They include both the current price estimates and volume estimates.

Table 10.42 QUARTERLY PRIVATE GROSS FIXED CAPITAL FORMATION—Dwellings

| Item | Comment |
|---|---|
| **Description** | Gross fixed capital formation (GFCF) on dwellings consists of the value of acquisitions of new and existing (used) dwellings less the value of disposals of existing dwellings.<br><br>It also includes the value of dwellings created by the conversion of existing non-dwelling buildings to dwellings, and the value of alterations and additions to existing dwellings.<br><br>Dwellings are buildings, or designated parts of buildings, that are used entirely or primarily as residences, including any associated structures regarded as fixed assets, such as garages, and all permanent fixtures customarily installed in residences. Houseboats, barges, mobile homes and caravans used as principal residences of households are also included and are regarded as fixed assets, as are public monuments identified primarily as dwellings.<br><br>The costs of clearing and preparing the site for construction are part of the costs of new dwellings (and non-dwelling construction) and are therefore included in the value of the buildings.<br><br>Incomplete dwellings are included to the extent that the ultimate user is deemed to have taken ownership, either because the construction is on own-account or as evidenced by the existence of a contract of sale or purchase.<br><br>Once dwellings are treated as an asset, all dwellings must give rise to housing services that are included within the production boundary, regardless of whether the dwellings are occupied by the owners or rented on the market. |
| **Current price estimates** | These are primarily based on the value of work done during the period on new residential buildings and on alterations and additions to residential buildings sourced from the quarterly Building Activity Survey (BACS).<br><br>This survey covers both public and private sector activity. Dwellings may be purchased by public housing authorities from private builders after being classified as private sector construction. To avoid incorrect classification of completed dwellings, estimates of GFCF for dwellings by the public sector are sourced from Government Finance Statistics. Public expenditure (which also allows for net sales of existing dwellings to the private sector) is deducted from total GFCF for dwellings to derive the correct value for the private sector. |
| **Private new dwellings** | Estimates are constructed using new residential building data from |

BACS plus modelled estimates for net expenditure on new dwellings not included within the scope of the BACS (e.g. dwellings on rural properties not requiring local government permits, existing commercial premises converted to dwelling use and caravans bought for use as dwellings) and modelled estimates for services involved in the dwelling construction (e.g. architects' and other professional fees), but excluding ownership transfer costs.

**General Government and Public Trading Enterprises - New Dwellings**

Estimates are obtained from Government Finance Statistics from the following Economic Type Framework (ETF) item Purchases of new assets (ETF 2221) in respect of dwellings (Type of Asset Code 111).

State level estimates are constructed by allocating each State/Territory Level of Government to the relevant state. Estimates for the National jurisdiction are allocated using a proportion based on public employment from the Survey of Employment and Earnings (SEE).

**General Government and Public Trading Enterprises - Used Dwellings**

State estimates are obtained directly from Government Finance Statistics by summing the following Economic Type Framework categories in respect of Dwellings (ETF Type of Asset Code 111):

- purchases of second-hand non-financial assets (ETF 2222);
- assets acquired under finance leases (ETF4101); and
- acquisitions of non-financial assets below fair value (ETF 1152)

*minus*

- sales of non-financial assets (ETF 2223); and
- donations (ETF 1252).

State level estimates are constructed by allocating each State/Territory Level of Government to the relevant state. Estimates for the National jurisdiction are allocated in proportion to employment from the Survey of Employment and Earnings.

**Private used dwellings**

Estimates for the public sector are used to estimate values for the private sector. By way of example, if the general government sector sells two used dwellings for $300k each (one to the private sector and one to a public trading enterprise) while a public non-financial corporation purchases a used dwelling from the private sector for $275k, estimates derived from Government Finance Statistics will generate -$600k for the general government sector and $575k (= $300k + $275k) for public non-financial corporations. Estimates for the private sector will be set equal to $25k to reflect this sector's net purchases.

It should be noted that dwellings are not allocated to a specific industry, however, they are shown as ownership of dwellings.

**Total private new and used dwellings**

Sum of the total value of dwellings from the quarterly Building Activity Survey (BACS) (including public) less purchases by general government plus sales by general government.

**Alterations and Additions**

Alterations and additions to existing dwellings are estimated using data from the regular BACS and from the periodic Household Expenditure Survey (HES).

BACS provides estimates of the value of work done on alterations and additions with an approval value of $10,000 or more. As a significant part of alterations and additions activity is not covered in the BACS, estimates from the HES are used to set the benchmark estimates of expenditure on alterations and additions.

State estimates are constructed using Alterations and additions to residential buildings from the BACS and applying a modeled estimate to account for work not captured by this survey (e.g. alterations and

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| | additions undertaken with an approval value below $10,000, do-it yourself (DIY) work not requiring a local government permit). |
| **Volume estimates** | Current price estimates of gross fixed capital formation for dwellings are deflated at the State level for each of the three categories: private houses; other dwellings; and alterations and additions, to express them in the prices of the previous year.<br><br>These estimates are then aggregated to form volume estimates for new and used dwellings and alterations and additions for Australia, and total dwellings for Australia and each State.<br><br>The resulting estimates expressed in the previous period prices are linked to form chain volume measures. |
| **New and used dwellings** | Current price estimates are deflated using composite State-specific price indexes with each State index derived as a weighted average of a price index for contract-built houses and a price index for other than contract-built houses using the project home price index from *House Price Indexes, Eight Capital Cities* (cat. no. 6416.0).<br><br>Contract-built house price indexes are derived as a two quarter ending moving average (i.e. an average of the current quarter and the previous quarter) of the project home price index from the ABS publication *House Price Indexes, Eight Capital Cities* (cat. no. 6416.0) for the respective State and Territory.<br><br>The other than contract-built house price indexes are derived as a four quarter ending moving average (i.e. an average of the current quarter and the three preceding quarters) of the project home price index from *House Price Indexes, Eight Capital Cities* (cat. no. 6416.0) for the respective State and Territory.<br><br>The two groups for contract-built and other types of dwelling construction are used to reflect the different lags between when prices are determined and when the work is done. |
| **Alterations and additions** | Current price estimates are deflated by applying a two quarter ending moving average of the project home price index from *House Price Indexes, Eight Capital Cities* (cat. no. 6416.0) to the respective State current price estimates. |

Table 10.43 QUARTERLY PRIVATE GROSS FIXED CAPITAL FORMATION—Non-dwelling construction

| Item | Comment |
|---|---|
| **Description** | Gross fixed capital formation (GFCF) in non-dwelling construction is recorded as the value of the acquisitions of new and existing non-dwelling buildings and structures, less the value of the disposals of existing non-dwelling buildings and structures, and the value of alterations and additions to existing non-dwelling buildings and structures.<br><br>Non-dwelling construction comprises of three components: new building, new engineering construction and net purchases of second-hand assets.<br><br>• New building consists of buildings that are not designated as dwellings. Fixtures, facilities and equipment that are integral parts of the structures are included. Examples of non-residential buildings include warehouses and industrial buildings, commercial buildings, buildings for public |

entertainment, hotels, restaurants, schools, hospitals, prisons etc.
- New engineering construction includes civil engineering works, such as highways, streets, roads, railways and airfield runways; bridges, elevated highways, tunnels and subways; waterways, harbours, dams and other waterworks; long-distance pipelines, communication and power lines; local pipelines and cables, ancillary works; constructions for mining and manufacture; and constructions of sport and recreation.
- Net purchases of second-hand assets consist of the purchase and sale of existing non-dwelling buildings and structures.

It should be noted that ASNA's estimates for non-dwelling construction excludes the value of ownership transfer costs (OTC). These costs, associated with the ownership transfer of an asset are collected in OTC as a separate line item in Private GFCF.

**Current price estimates**

**New non-dwelling buildings**

The main source is the quarterly Building Activity Survey (BACS). This survey covers work done on private sector owned non-residential building valued at $50,000 or more.

The following adjustments are made:
- for work done on non-residential building with an approval value of less than $50,000;
- where approvals are not obtained such as for farm buildings; and
- for services involved in the construction of the building such as architect fees.

**New engineering construction**

The main source is the Engineering Construction Survey (ECS).

As farm non-dwelling construction is not included in the ECS, adjustments are made to capital formation to estimate expenditure of farm on non-dwelling construction.

**Net purchases of second-hand assets**

The estimates from both the BACS and the ECS are adjusted to reflect net purchases of second-hand assets from the public sector by using Government Finance Statistics data.

**Total private non-dwelling construction**

New building (BACS private for private) plus engineering construction (ECS private for private) plus net purchases of second-hand assets from the public sector.

**Volume estimates**

Current price estimates of gross fixed capital formation for non-dwelling construction are deflated at the State level for each component.

**New non-dwelling buildings**

State specific price indexes are derived as a three quarter ending moving average of new building price indexes compiled by the ABS.

**New engineering construction**

Current price estimates are deflated using a composite of price indexes for roads, dams, sewerage, electricity infrastructure and telecommunications infrastructure. For all but road construction, these price indexes are derived for Australia only.

The price indexes used are from the *Producer Price Indexes, Australia* (cat. no. 6427.0), Wage *Price Index, Australia* (cat. no. 6435.0) and the *Consumer Price Index, Australia (cat. no. 6401.0)*.

**Net purchases of second-hand assets**

Current price estimates are deflated for each State using the State specific implicit price deflator of the aggregate of private new non-dwelling building and new engineering construction.

Table 10.44 QUARTERLY PRIVATE GROSS FIXED CAPITAL FORMATION—Machinery and equipment

| Item | Comment |
|---|---|
| **Description** | Gross fixed capital formation (GFCF) in machinery and equipment is recorded as the value of the acquisitions of new and existing machinery and equipment, less the value of the disposals of existing machinery and equipment.<br><br>Machinery and equipment is classified according to six asset types:<br>• Computers and peripherals<br>• Electrical and electronic equipment<br>• Industrial machinery and equipment<br>• Motor vehicles<br>• Other transport equipment<br>• Other machinery and equipment.<br><br>ASNA's machinery and equipment mirrors the SNA 2008 concept.<br><br>In the ASNA, private gross fixed capital formation in machinery and equipment is presented with two sub-components: new machinery and equipment and net purchases of second-hand assets. |
| **Current price estimates** | |
| **New machinery and equipment** | The main data source is the Survey of New Capital Expenditure (*Private New Capital Expenditure and Expected Expenditure, Australia*, (cat. no. 5625.0)). This survey provides estimates of new capital expenditure by private businesses for selected industries.<br><br>The following outlines adjustments that are made to industries that are out of scope of the survey:<br><br>• Agriculture, Forestry and Fishing industry - import statistics from *International Merchandise Imports, Australia* (cat. no. 5439.0) are used; and<br>• Public Administration and Safety, Education and Training and Health Care and Social Assistance industries - estimates are obtained by applying the average movement of the industries covered in the *Survey of New Capital Expenditure.*<br><br>Data from the Survey of New Capital Expenditure is also used to calculate industry weights for both new machinery and equipment and net purchases of second-hand assets. |
| **Net purchases of second-hand assets** | Net purchase of second-hand assets covers the purchases of second-hand assets from the public sector (which are added to private GFCF), used motor vehicle sales from businesses to households and used equipment sold overseas (both of which are deducted from private GFCF).<br><br>An estimate of the value of net purchases of second-hand assets from the public sector is derived using data from quarterly surveys of public financial and non-financial corporations and Government Finance Statistics data for general government units.<br><br>An estimate of the value of motor vehicle sales from businesses to households is deducted. This estimate is first derived on an annual basis using a perpetual inventory model of the stock of vehicles incorporating data from the ABS Survey of Motor Vehicle Use and motor vehicle sales data available through the VFACTS services. Quarterly estimates are then interpolated and extrapolated according to new motor vehicle sales.<br><br>An estimate of the value of used equipment sold overseas is also |

deducted. This estimate is derived from the international trade statistics.

**Volume estimates**

Current price estimates of GFCF for new machinery and equipment and net purchases of second-hand machinery and equipment are deflated at the State level using State-specific chain price indexes.

The indexes are compiled using the following process:

- derive quarterly current price and chain volume estimates of the supply of capital goods split into six broad asset type categories
- derive implicit price deflators (IPDs) for each of the six asset types
- using an annual supply and use model, encompassing both the private and public sectors, impute estimates of GFCF for each of the six asset types for each institutional sector for each industry at the 1 digit (Division) level of ANZSIC
- for each industry in the private sector, interpolate the annual imputations of GFCF in each category by the total estimates of quarterly supply of that category, to produce quarterly estimates of GFCF for each industry for each of six asset types
- use the IPDs for the six asset types from the second stage to deflate them.

The price indexes used for deflation are from the *Consumer Price Index, Australia* (cat. no. 6401.0), *Producer Price Indexes, Australia* (cat. no. 6427.0), *International Trade Price Indexes, Australia* (cat. no. 6457.0) and several price indexes from overseas, including the US Bureau of Economic Analysis hedonic computer price index.

Table 10.45 QUARTERLY PRIVATE GROSS FIXED CAPITAL FORMATION—Cultivated biological resources

| Item | Comment |
|---|---|
| **Description** | 2008 SNA defines cultivated biological resources as animal resources (livestock) yielding repeat products and tree, crop and plant resources (orchard growth) yielding repeat products whose natural growth and regeneration are under the direct control, responsibility and management of institutional units.<br><br>*Livestock* includes breeding stocks, dairy cattle, draft animals, sheep or other animals used for wool production and animals used for transportation, racing or entertainment as well as aquatic resources which are maintained for controlled reproduction.<br><br>*Orchard growth* includes trees (including vines and shrubs) cultivated for fruits and nuts, for sap and resin and for bark and leaf products.<br><br>GFCF in *livestock* is measured by the total value of all mature animals and immature animals produced on own account acquired by users of the livestock less the value of their disposal. Disposals consist of animals sold or otherwise disposed of, including those sold for slaughter, plus those animals slaughtered by their owners. Exceptional losses of animals due to major outbreaks of disease, contamination, drought, famine, or other natural disasters are recorded in the Other changes in the volume of assets account and not as disposals. Incidental losses of animals due to occasional deaths from natural causes form part of consumption of fixed capital.<br><br>GFCF in *orchard growth* consists of the value of the acquisitions less disposals of mature trees, shrubs, etc., including acquisitions of immature trees, shrubs, etc., produced on own account. Disposals consist of trees, shrubs, etc., sold or otherwise transferred to other units |

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| | plus those cut down before the end of their service lives. Disposals do not include exceptional losses of trees due to drought or other natural disasters such as gales or hurricanes, these being recorded in the Other changes in the volume of assets account. |
| **Current price estimates** | A linear trend interpolation is used to split the annual value over the four quarters. |
| **Volume estimates** | Quarterly estimates are trended from the annual. |

Table 10.46 QUARTERLY PRIVATE GROSS FIXED CAPITAL FORMATION—Intellectual property products

| Item | Comment |
|---|---|
| **Research and development** | |
| **Description** | Gross fixed capital formation (GFCF) of R&D, as defined in 2008 SNA, consists of the value of expenditures on creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and use of this stock of knowledge to devise new applications. This does not, however, include human capital as assets within the SNA. It should also be recognised that R&D products are very heterogeneous and not all R&D products are fixed assets and hence their classification should be determined by the economic benefit they are expected to provide in the future. In other words, R&D that does not provide an economic benefit to its owner does not constitute a fixed asset and should be treated as intermediate consumption.<br><br>The nature of R&D poses measurement challenges because R&D products are very heterogeneous and not all R&D products are sold in the market. The 2008 SNA recommends that the output of R&D should be valued at market prices if purchased (outsourced) or at the sum of total production costs plus an appropriate mark-up representing the costs of fixed assets used in production if undertaken on own account. R&D undertaken by specialised commercial research laboratories or institutes is valued by receipts from sales, contracts, commissions, fees, etc. in the usual way. R&D undertaken by government units, universities, non-profit research institutes, etc. is non-market production and should be valued on the basis of the total costs incurred excluding a return to capital used.<br><br>The ASNA's treatment of R&D requires a fundamental distinction between R&D services and own account R&D.<br><br>The R&D services refer to market transactions in R&D as suggested in the 2008 SNA reference to 'specialized commercial research laboratories or institutes'. The output of these units includes the sale of R&D and is therefore considered other non-market production and hence valued as suggested in 2008 SNA (at the cost of production).<br><br>The own account R&D refers to production or R&D undertaken by own account and consists of:<br>• Production of R&D by market producers on own account. For example consider a manufacturing unit producing computer screens and also undertaking R&D to improve methods for computer screen production. This unit will be classified by ANZSIC06 to the Manufacturing Division (where computer screens are primary) and will have output of both computer screens and own account R&D.<br>• R&D undertaken by non-market units (either primary production or own account). |

All output and GFCF of own account R&D is considered to be non-market production and is valued by summing the total production costs. It is also important to note that these costs include intermediate consumption of the R&D product and should be deducted from the GFCF accordingly.

**Current price estimates**

Evenly distribute the annual estimate across the quarters.

**Volume estimates**

Quarterly estimates are trended from the annual.

**Mineral and petroleum exploration**

**Description**

Mineral and petroleum exploration is the value of expenditure on exploration for petroleum and natural gas and for non-petroleum deposits and subsequent evaluation of the discoveries made. Expenditure on mineral exploration are not treated as intermediate consumption. Whether they are successful or not, they are needed to acquire new reserves and are, therefore, all classified as gross fixed capital formation.

This item covers expenditure on exploration for petroleum (including oil shale), metallic minerals, construction materials, gemstones, and other non-metallic minerals less expenditure on successful bids for offshore petroleum leases (which is regarded as intermediate expenditure, not capital formation).

Mineral exploration is undertaken in order to discover new deposits of minerals or fuels that may be exploited commercially.

Exploration expenditure covers all exploration activity undertaken on land and in Australia's territorial waters and the continental shelf over which Australia exercises exclusive rights. It includes pre-licence costs, licence and acquisition costs, appraisal costs, expenditure on aerial surveys, (including Landsat photographs), general surveys, report writing, map preparation and other activities indirectly attributable to exploration.

**Current price estimates**

Quarterly estimates are obtained from *Mineral and Petroleum Exploration, Australia* (cat. no. 8412.0).

**Volume estimates**

Current price estimates are deflated using a composite price index of the Wage Price Index (for the Mining Division) (from Wage *Price Index, Australia* (cat. no. 6345.0)) and Producer Price Index (for equipment and material categories associated with exploration—steel pipes and tubes, non-ferrous pipe fittings, iron and steel casting and forging, and other industrial machinery), (from *Producer Price Indexes, Australia* (cat.no. 6427.0)).

**Computer software**

**Description**

Computer software consists of computer programs, program descriptions and supporting materials for both systems and applications software. It also includes databases which consist of files of data organised in such a way as to permit resource-effective access and use of the data.

Gross fixed capital formation (GFCF) in computer software can include both the initial in-house development and subsequent extensions of software as well as software purchased on the market.

Software purchased on the market, which is valued at purchasers' prices, includes both products purchased 'off the shelf' and customised software designed by a specialist for a specific customer. Software developed in-house is valued at its estimated basic price or at its cost of production if it is not possible to estimate the basic price.

GFCF in databases includes the purchase or development of databases

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| | that the enterprise expects to use in production over a period of more than one year. Databases may be developed exclusively for own use or for sale as an entity or for sale by means of a licence to access the information contained. |
| **Current price estimates** | Quarterly estimates are derived by interpolating between and extrapolating from the annual estimates as follows:<br>• computer software developed in-house plus purchases of customised software are derived using linear trend interpolation; and<br>• estimates of computer software purchased 'off the shelf' are derived using imports of computer software as an indicator. |
| **Volume estimates** | Current price estimates are deflated using the Articles Produced by the Manufacturing Industry (APMI) price index. |
| **Entertainment, literary and artistic originals** | |
| **Description** | This item covers the production of originals of films, television programs, music products, and books. 2008 SNA describes the production of entertainment, literary and artistic originals as a two-stage process of which the first stage is the production of the original and the second stage the production and use of copies of the original. |
| **Current price estimates** | Quarterly estimates for film, television and recorded music are interpolated and extrapolated from the annual estimates using linear trend methodology. |
| **Volume estimates** | Current price estimates are deflated as follows:<br>• *Film and television:* current price estimates of gross fixed capital formation for film and television originals are deflated using a price index for entertainment services (*Consumer Price Index, Australia* (cat. no. 6401.0)) as the future revenue/royalty streams are likely to be driven by box office sales.<br>• *Music originals:* current price estimates of gross fixed capital formation for music originals are deflated using the price indexes for records and cassettes (*Consumer Price Index, Australia* (cat. no. 6401.0)).<br>• *Literary works*: current price estimates of gross fixed capital formation for literary originals are deflated using the PPI component index for books, newspapers and magazines (*Producer Price Indexes, Australia* (cat. no. 6427.0)).<br><br>Estimates of capital formation in the previous year's prices are used to construct chain volume measures. |

Table 10.47 QUARTERLY PRIVATE GROSS FIXED CAPITAL FORMATION—Ownership transfer costs

| Item | Comment |
|---|---|
| **Description** | Acquisitions of new assets are valued at actual or estimated purchasers' prices plus the associated costs of ownership transfer incurred by units acquiring the assets. Similarly, acquisitions of existing assets are valued at the actual or estimated prices payable to their previous owners plus the associated costs of ownership transfer incurred by the units acquiring the assets. Ownership transfer costs consist of the following components:<br>• fees paid to lawyers;<br>• fees and commissions paid to real estate agents, auctioneers, architects, surveyors, engineers and valuers;<br>• stamp duty;<br>• Titles Office charges; and |

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| | • local government charges.<br><br>Ownership transfer costs in the ASNA relate to dwellings, non-dwelling construction, and unoccupied land. |
| **Current price estimates** | Quarterly estimates for real estate agents' commissions and lawyers' fees are derived from movements in a composite indicator based on State data for the number and value of real estate transactions.<br><br>Periodic changes in scheduled fees are taken into account as well as changes in average charges from the declining rate schedules that generally apply.<br><br>Data on the number of transactions and average sale prices are obtained from State Titles Offices (Land Title Transfers) and Valuers'-General Departments (Average Sale Prices).<br><br>Stamp duty estimates are based on quarterly data from each State government. Titles Office estimates are based on the number of Land Title Transfer transactions occurring in each State for the quarter and local government charges are estimated from the number of transactions occurring in each quarter. |
| **Volume estimates** | Volume estimates for ownership transfer costs are derived by quantity revaluation at the State level, by multiplying the number of transactions by the average price in the previous year. |

Table 10.48 QUARTERLY PUBLIC GROSS FIXED CAPITAL FORMATION—Public corporations

| Item | Comment |
|---|---|
| **Commonwealth** | |
| **Current price estimates** | The quarterly data source is the Government Finance Statistics which is obtained from individual returns from Commonwealth public non-financial corporations.<br><br>Adjustments are made to deduct current expenditure on wages, salaries and consumables to produce intellectual property products on own account which are treated as gross fixed capital formation. The intellectual property products included are as follows:<br><br>• computer software; and<br>• research and development.<br><br>The data collected is by the following asset types:<br><br>• dwellings;<br>• non-dwelling construction;<br>• machinery and equipment; and<br>• intellectual property products as listed above.<br><br>Amounts for new and second-hand purchases or disposals are determined in order to derive net second-hand purchases. This allows for the identification of private net sector purchases of capital from the public sector which are used in the compilation of private sector gross fixed capital formation. |
| **Volume estimates** | The volume estimates are compiled from current price estimates using price deflation. Deflation is performed using composite deflators of price indexes and their weights according to the following:<br>• computer software;<br>• research and development; and |

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|---|---|
| | • all other capital formation. |
| **State and local**<br>**Current price estimates** | The quarterly data source is the Government Finance Statistics which is obtained from a mixture of centralised returns from State and Territory Treasuries for approximately half of the jurisdictions, survey forms from individual public corporations for the remainder of the States and Territories, and a 20% sample of local governments.<br><br>Adjustments are made to deduct current expenditure on wages, salaries and consumables to produce intellectual property products on own account which are treated as gross fixed capital formation. The intellectual property products included are as follows:<br><br>• computer software; and<br>• research and development.<br><br>The data collected is by the following asset types:<br><br>• dwellings;<br>• non-dwelling construction;<br>• machinery and equipment; and<br>• intellectual property products as listed above.<br><br>Amounts for new and second-hand purchases or disposals are determined in order to derive net second-hand purchases. This allows for the identification of private net sector purchases of capital from the public sector which are used in the compilation of private sector gross fixed capital formation. |
| **Volume estimates** | The volume estimates are compiled from current price estimates using price deflation. Deflation is performed using composite deflators of price indexes and their weights according to the following:<br>• computer software;<br>• research and development; and<br>• all other capital formation. |

Table 10.49 QUARTERLY PUBLIC GROSS FIXED CAPITAL FORMATION—General government

| Item | Comment |
|---|---|
| **National—defence**<br>**Current price estimates** | The quarterly data source is the Government Finance Statistics which is obtained from quarterly returns from the Commonwealth Department of Finance and Deregulation.<br><br>Adjustments are made to deduct current expenditure on wages, salaries and consumables to produce intellectual property products on own account which are treated as gross fixed capital formation. The intellectual property products included are as follows:<br><br>• computer software; and<br>• research and development.<br><br>The data collected is by the following asset types:<br><br>• defence weapons systems;<br>• dwellings;<br>• non-dwelling construction;<br>• machinery and equipment; and<br>• intellectual property products as listed above. |

Amounts for new and second-hand purchases or disposals are determined in order to derive net second-hand purchases. This allows for the identification of private net sector purchases of capital from the public sector which are used in the compilation of private sector gross fixed capital formation.

**Volume estimates**

The volume estimates are compiled from current price estimates using price deflation. Deflation is performed using composite deflators of price indexes and their weights according to the following:

- computer software;
- research and development; and
- all other capital formation.

**National—non-defence**
**Current price estimates**

The quarterly data source is the Government Finance Statistics which is obtained from quarterly returns from the Commonwealth Department of Finance and Deregulation and a sample of approximately 22% of public universities.

Adjustments are made to deduct current expenditure on wages, salaries and consumables to produce intellectual property products on own account which are treated as gross fixed capital formation. The intellectual property products included are as follows:

- computer software;
- mineral exploration;
- artistic originals; and
- research and development.

The data collected is by the following asset types:

- dwellings;
- non-dwelling construction;
- machinery and equipment; and
- intellectual property products as listed above.

Amounts for new and second-hand purchases or disposals are determined in order to derive net second-hand purchases. This allows for the identification of private net sector purchases of capital from the public sector which are used in the compilation of private sector gross fixed capital formation.

**Volume estimates**

The volume estimates are compiled from current price estimates using price deflation. Deflation is performed using composite deflators of price indexes and their weights according to the following:

- computer software;
- research and development; and
- all other capital formation.

In addition, capitalised film and television production uses a single Consumer Price Index component (Entertainment Services).

**State and local**
**Current price estimates**

The quarterly data source is the Government Finance Statistics which is obtained from quarterly returns from the State and Territory Treasuries and a 20% sample of local governments.

Adjustments are made to deduct current expenditure on wages, salaries and consumables to produce intellectual property products on own account which are treated as gross fixed capital formation. The intellectual property products included are as follows:

| | |
|---|---|
| | • computer software; and<br>• research and development.<br><br>The data collected is by the following asset types:<br><br>• dwellings;<br>• non-dwelling construction;<br>• machinery and equipment; and<br>• intellectual property products as listed above.<br><br>Amounts for new and second-hand purchases or disposals are determined in order to derive net second-hand purchases. This allows for the identification of private net sector purchases of capital from the public sector which are used in the compilation of private sector gross fixed capital formation. |
| **Volume estimates** | The volume estimates are compiled from current price estimates using price deflation. Deflation is performed using composite deflators of price indexes and their weights according to the following:<br>• computer software;<br>• research and development; and<br>• all other capital formation. |

## Changes in inventories

### Concept

10.110 Changes in inventories are measured by the value of the entries into inventories less the value of withdrawals and less the value of any recurrent losses of goods held in inventories during the accounting period. Changes in inventories are defined to include changes in holdings of:

- goods for sale, whether of own production or purchased for resale;
- work-in-progress; and
- raw materials and stores to be used as intermediate inputs into production.

10.111 It should be noted that work-in-progress on cultivated biological resources is recorded for single use resources only, that is, plants, trees and livestock that produce an output once only (e.g. when the plants and trees are cut down or uprooted or the livestock slaughtered). For repeat yield resources (e.g. livestock producing milk, wool, etc. and fruit and nut trees), that are cultivated on own account or under an agreed contract with another enterprise, the growth is counted as fixed capital formation and is excluded from inventories. Any remaining cultivation of resources with repeat yields, such as nurseries and breeding of race horses, is treated as work-in-progress.

10.112 Work which has commenced and is ongoing for structures, including dwellings, and on other forms of construction (e.g. roads, dams, ports) is excluded from inventories and included in GFCF. However, work on incomplete heavy machinery and equipment (e.g. shipbuilding) is included in changes in inventories. Land and financial assets are not regarded as inventories.

### Valuation of changes in inventories

10.113 The value of inventories recorded in business accounts at the end of each accounting period is known as the book value. Period to period changes in the book value of inventories can be calculated by deducting the book value of inventories at the end of the previous accounting period from the book value at the end of the current accounting period.

10.114 For national accounting purposes, the physical change in inventories during a period should be valued at the prices prevailing at the time that inventory changes actually occur. Therefore, the goods transferred out of inventories (i.e. raw materials and stores) are valued at purchasers' prices current at the time of the withdrawal from inventories. Finished goods transferred into inventories are valued as if they were sold at that time and additions to work-in-progress are given the value they have at the time they are added to inventories.

10.115 In practice, many businesses adopt historical cost measurement whereby inventories are valued at the lower of cost or market prices. Beginning-of-period inventories are valued at costs or prices prevailing at the beginning of the accounting period, and end-of-period inventories are valued at costs or prices prevailing at the end of the period. As a result, in periods of rising prices the book value of inventories will frequently include an element of capital gain, even if there has been no change in the physical quantity of inventories held. Conversely, if prices are falling, the book value of inventories will include an element of capital loss even with no change in the quantity of inventories on hand. Therefore, in times of rising prices, the change in the book value measured on a historical cost basis will include both the value of the physical increase or decrease in inventories and an increase in value due to the effect of rising prices on the value of inventories held. The latter effect is an element of holding gain (or holding loss if prices are falling), which should be excluded from changes in inventories and included in revaluations.

10.116 In the ASNA, an inventory valuation adjustment (IVA) is made to remove the effects of such gains or losses from book values of changes in inventories. As initial estimates of gross operating surplus incorporate the effect of the value of inventories derived on a historical cost basis, the IVA is also deducted from those estimates.

10.117 There are several methods used to measure inventories in business accounts. These include:

- *First in first out* (FIFO) – items held in store for the longest time are assumed to be the first to be drawn from store, so that inventories will consist of the most recently acquired items.
- *Last in first out* (LIFO) – this system uses the opposite assumption to FIFO. The most recently acquired items are assumed to be the first drawn from store, so that inventories consist of the items first purchased.
- *Historical cost* – inventories are valued at the actual cost of acquisition, with no allowance for inflation.
- *Current cost* – inventories are valued at replacement cost, rather than the cost of acquisition. This measure is generally derived by adjusting values obtained under historical cost for the effect of inflation.
- *Average cost* – running totals are held of the value and volume of inventories. The average price of goods held in inventories is recalculated periodically, e.g. when new goods are received. Any subsequent withdrawal from inventories is then made at that price until the average is recalculated.
- *Standard cost* – under a standard cost system, items held in stock are each given a unit value, which may be based on recent costs, current costs, or expected future costs. Once this standard has been set, the value of a company's inventories is determined by multiplying the quantity of each commodity in stock by its standard cost. The standard is generally maintained for a fixed period (usually a company's financial year), or until changing prices make the standard inappropriate for current conditions.

10.118 The current methodology underlying the derivation of the IVA in the ASNA is based on the assumption that businesses generally value their inventories at historical cost and employ the FIFO method of handling inventories.

10.119 In general, the IVA is calculated in three basic steps:

1. an estimate is made of the value of inventories at constant prices at the end of each quarter by revaluing end of quarter book values to base year prices using price indexes; the value of changes in inventories at constant prices is then derived as the difference between successive end of quarter levels;

2. the estimates of the values of changes in inventories at constant prices are multiplied by price indexes that reflect current quarter average prices; this calculation gives an estimate of the physical change in inventories at average current quarter prices; and

3. the IVA is the difference between the value of changes in the book value of inventories obtained from business accounting records and the value of changes in inventories estimated in 2.

10.120 The following table illustrates how the IVA is calculated by way of an example.

Table 10.50 Example of the calculation of the IVA

**(1) Change in book value**

| | | |
|---|---|---|
| Book value of inventories at end of quarter (t) | = | 51,000 |
| Book value of inventories at end of quarter (t+1) | = | 55,056 |
| Change in book value | = | 4,056 |
| Base of price index | = | 100 |
| Price index at end of quarter (t) | = | 120 |
| Price index at end of quarter (t+1) | = | 124 |
| Average price index for quarter (t+1) | = | 122 |

**(2) Revaluation to constant prices**

| | | | | |
|---|---|---|---|---|
| Constant price level | = | book value ÷ price index x 100 | | |
| End quarter (t) | = | 51,000 ÷ 120 x 100 | = | 42,500 |
| End quarter (t+1) | = | 55,056 ÷ 124 x 100 | = | 44,400 |
| Constant price change in inventories | = | 44,400 - 42,500 | = | 1,900 |

**(3) Revaluation to current quarter prices**

Change in inventories at current quarter prices = change at constant prices x average price index for current quarter ÷ 100
= 1,900 x 122 ÷ 100
= 2,318

**(4) Derivation of the IVA**

IVA = change in book value - physical change at current quarter prices
= 4,056 - 2,318
= 1,738

10.121 Beside the assumption that book values are based on historical cost and FIFO conventions, the method used to estimate the IVA rests on four other assumptions:

1. sales prices for finished goods held in inventories can be used to adjust inventory levels valued at cost, i.e. the selling price of finished goods is established as a fixed mark-up on the costs incurred in the current quarter;
2. each commodity (or group of commodities) held in inventories has a fixed turnover period, i.e. the ratios 'inventory level of materials to value of purchases' and 'inventory level of finished goods to value of sales' remain constant for each commodity;
3. the commodity composition of inventories held by any particular industry remains fixed; and
4. the rate of physical increase (or decrease) in inventories is constant throughout the quarter.

Sources and methods – Annual

*Benchmark years*

10.122 Annual S-U benchmarks for change in inventories are economy-wide, and are not split by industry or sector. Unbenchmarked values of changes in inventories are calculated from quarterly data for three sectors: private non-farm; farm; and public authorities. The sources and methods relating to calculation of the total changes in inventories (i.e. the S-U benchmarks) and each of the sectoral categories (including how they are benchmarked to the S-U benchmark) are discussed in the tables that follow.

Table 10.51 ANNUAL CHANGES IN INVENTORIES—Total

| Item | Comment |
|---|---|
| **Current price** | The Economic Activity Survey is the source for the private sector as well as public non-financial corporations changes in inventories. It provides the following data:<br>• raw materials;<br>• work-in-progress; and<br>• finished goods.<br><br>Government Finance Statistics is the source for the general government sector changes in inventories. It provides changes in inventories in total which is allocated to industry in proportion to government output. It is assumed all changes in inventories for general government are raw materials.<br><br>Changes in inventories of raw materials are classified to the IOPC level by applying the proportion of the inventory products of intermediate use from the input and output tables to the total changes in inventories of raw materials.<br><br>Changes in inventories of work-in-progress and finished goods for all industries except wholesale, retail and food and beverage services are classified to the IOPC level by applying the proportion of the inventory products of supply from the input and output tables to the total changes in inventories of work-in-progress and finished goods.<br><br>Changes in inventories of work-in-progress and finished goods for the wholesale, retail and food and beverage services industries are classified to the IOPC level by applying the proportion of the margins distributions from the input and output tables to the total changes in inventories of work-in-progress and finished goods for the wholesale, retail and food and beverage services industries.<br><br>The IOPC level data for all changes in inventories components are aggregated to the Supply and Use Product Classification (SUPC) level.<br><br>**Supply and Use balancing process**<br><br>The HFCE estimates at the SUPC level are inserted into the Use table which is balanced with the Supply table at the product level using the product flow method. Therefore adjustments are likely to be applied to the initial HFCE estimate to obtain a balance between supply and use. The adjustments are determined by confronting the supply and use data with industry association data, annual reports of significant units within the industry as well as other relevant ABS survey results.<br><br>For more information on the product flow method refer to Chapter 7. |
| **Chain volume measures** | Current price estimates of inventories at the IOPC level are deflated using the supply deflator for that IOPC. |

Table 10.52 ANNUAL CHANGES IN INVENTORIES—Private non-farm inventories

| Item | Comment |
|---|---|
| **Current price** | The difference between the annual S-U benchmark for changes in inventories and the sum of the unbenchmarked quarterly estimates for each year is derived. This difference is then prorated across the following categories of private non-farm change in inventories: mining, manufacturing, wholesale and retail. |
| **Chain volume measures** | The most successful means of deriving chain volume changes in inventories has been found to be differencing chained estimates of the levels. The steps involved are as follows:<br><br>1. Re-value quarterly book value levels to levels valued in the prices of the previous year.<br><br>2. Sum to the required level of aggregation.<br><br>3. Calculate quarter to quarter indexes which show the volume growth in levels between the present and previous quarter.<br><br>4. Compound these indexes to form a chained index.<br><br>5. Reference the chained index to the June quarter book value level of the reference year to give a chain volume series of levels.<br><br>6. Difference the resultant values to derive the chain volume estimates of changes in inventories.<br><br>The price indexes that are used to re-value book value levels of inventories are formed by weighting together component price indexes from *Consumer Price Index, Australia* (cat. no. 6401.0), *Price Index of Articles Produced by Manufacturing Industry, Australia* (cat. no. 6412.0), *Import Price Index* (cat. no. 6414.0) and *Price Indexes of Materials Used in Manufacturing Industries, Australia* (cat. no. 6411.0), and wage rate indexes from Wage *Price Index, Australia* (cat. no. 6345.0). The regimen and weights for these price and wage rate indexes are derived using data from the various censuses and surveys conducted by the ABS.<br><br>Chain volume estimates of changes in private non-farm inventories are published in the following detail in the national accounts:<br><br>• mining;<br>• manufacturing;<br>• wholesale trade;<br>• retail trade; and<br>• other non-farm industries.<br><br>It is noteworthy that, unlike other national accounts aggregates, quarterly chaining and annual chaining of volumes of changes in inventories produce identical annual chain volume estimates of changes in inventories. This is because chain volume estimates of changes in inventories are derived by differencing the chain volume estimates of the levels of inventories which relate to the end of quarterly and annual periods and coincide for the June quarter. |

Table 10.53 ANNUAL CHANGES IN INVENTORIES—Farm inventories

| Item | Comment |
|---|---|
| **Current price** | Changes in farm inventories include changes in<br>• inventories held on farms (including wool, wheat, barley, oats, maize, sorghum, hay, fertiliser, apples and pears, and livestock);<br>• wool held in store awaiting sale; and<br>• produce (e.g. vegetables) held in cold store where ownership remains with the primary producer.<br><br>Annual changes in the book value of inventories of wool are estimated as the difference between inventory levels derived from available information obtained from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities*, Australian Wool Exchange and also from various ABS agricultural statistics. Annual changes in the book value of inventories of apples and pears are estimated as the difference between inventory levels, which was modelled from data provided by the Tasmanian Department of Agriculture.<br><br>Annual changes in the book value of inventories of grain crops held on farms are derived as the difference between the value of production and disposals, i.e. exports and domestic usage of the various commodities. Annual values of gross value of farm production of crops are obtained from *Value of Agricultural Commodities Produced, Australia* (cat. no. 7503.0) and Australian Bureau of Agricultural and Resource Economics and Sciences publication *Agricultural Commodities*. Disposals are estimated from export statistics, estimates of seed purchased or retained on farms for use as seed or fodder, and materials used in manufacturing statistics, which are modelled from data obtained from the ABS publications *International Trade in Goods and Services, Australia* (cat. no. 5368.0), *Value of Agricultural Commodities Produced* and also from the Quarterly Business Indicators Survey. Although exports data are available quarterly from ABS trade statistics, various indicators must be used to derive quarterly data relating to production of grain crops. For example, annual data on gross value of production and on seed and fodder use are allocated to quarters according to fixed proportions based on harvest and planting seasons and assumed seasonal requirements for fodder.<br><br>In general, animals reared for slaughter are regarded as work-in-progress. The estimates are derived from numbers of sheep and beef cattle collected annually by the ABS and prices from Australian Bureau of Agricultural and Resource Economics and Sciences. Animals reared for breeding purposes or recurrent production (such as dairy cattle and sheep reared for wool production) are regarded as gross fixed capital formation. |
| **Chain volume measures** | The techniques used to calculate chain volume estimates of changes in farm inventories are only slightly different to those shown above for private non-farm. The difference is that for many of the detailed components of the former it is difficult to obtain true book value levels of inventories. Therefore, constant price estimates of changes in inventories that preceded the introduction of chain volume estimates are used in the calculations.<br><br>The steps followed are:<br>1. Derive constant price levels of inventories for each component by accumulating the constant price changes over time and add these to a base level (i.e. the level at a particular time for which there is an estimate). The base level is often only an approximation of the true level and is sometimes only derived as |

a figure which will ensure that subsequent levels remain positive. These constant price levels are then converted to levels valued in the prices of the previous year.

2. Sum to the required level of aggregation.

3. Calculate quarter to quarter indexes which show the volume growth in levels between the present and previous quarter.

4. Compound these indexes to form a chained index.

5. Reference the chained index to the June quarter book value level of the reference year to give a chain volume series of levels.

6. Difference the resultant values to derive the chain volume estimates of changes in inventories.

For farm commodities the price indexes used to convert constant price levels into levels valued in the prices of the previous year are calculated using production unit values.

Table 10.54 ANNUAL CHANGES IN INVENTORIES—Public authority inventories

| Item | Comment |
|---|---|
| **Current price** | Changes in public authorities' inventories include estimates for general government, public non-financial corporations and public financial corporations.<br><br>Recorded inventories include demonetised gold transactions (gold sales and gold loans) by the Reserve Bank of Australia (RBA) and the construction of military equipment for export.<br><br>Annual estimates of changes in the current price value of other public authorities' inventories are derived from information in the annual ABS Government Finance Statistics. They are derived from a detailed analysis of annual reports and Auditors'-General Reports, together with Commonwealth and State government budget papers and other financial statements. |
| **Chain volume measures** | The techniques used to calculate chain volume estimates of changes in public authority inventories are only slightly different to those shown above for private non-farm. The difference is that for many of the detailed components of the former it is difficult to obtain true book value levels. Use is therefore made of the constant price estimates of changes in inventories that preceded the introduction of chain volume estimates and which are still calculated.<br><br>The steps followed are:<br><br>1. Derive constant price levels of inventories for each component by accumulating the constant price changes over time and add these to a base level (i.e. the level at a particular time for which there is an estimate). The base level is often only an approximation of the true level and is sometimes only derived as a figure which will ensure that subsequent levels remain positive. These constant price levels are then converted to levels valued in the prices of the previous year.<br><br>2. Sum to the required level of aggregation.<br><br>3. Calculate quarter to quarter indexes which show the volume |

growth in levels between the present and previous quarter.

4. Compound these indexes to form a chained index.

5. Reference the chained index to the June quarter book value level of the reference year to give a chain volume series of levels.

6. Difference the resultant values to derive the chain volume estimates of changes in inventories.

For the other public authority inventories component a price index is constructed in a similar way to that described above for private non-farm inventories.

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*Latest year*

**10.123** Latest year annual estimates of the changes in inventories are essentially an aggregation of the quarterly estimates.

**10.124** Current price change in inventories data are further disaggregated by institutional sector, with results published in the annual sectoral capital accounts in *Australian System of National* Accounts (cat. no. 5204.0). General government and public non-financial corporations annual estimates for change in inventories are derived from Government Finance Statistics. Private non-financial estimates sector are derived internally from quarterly data used to compile estimates for private non-farm and farm inventories, whereas estimates for financial corporations are based on data on transactions in non-monetary gold provided by the Reserve Bank of Australia (the assumption is made that inventories for private financial corporations are relatively small). Change in inventories for the household sector is then derived residually.

Sources and methods – Quarterly

10.125 Quarterly estimates for change in inventories are aligned to annual benchmarks by calculating the difference between the annual economy-wide benchmark and the sum of the unbenchmarked quarterly estimates for each year, and prorating the difference across the following categories of private non-farm change in inventories: manufacturing, wholesale, retail and mining. Quarterly change in inventories for other private non-farm, farm, and public inventories are not adjusted as part of the annual benchmarking process. A quarterly value of the changes in inventories is obtained by deducting the IVA from the corresponding quarterly value of the changes in the book value of inventories.

10.126 The quarterly values of changes in inventories are calculated separately for three sectors: private non-farm; farm; and public authorities. The sources and methods relating to each of these sectoral categories and the IVA are discussed in the tables that follow.

Table 10.55 QUARTERLY CHANGES IN INVENTORIES—Private non-farm inventories

| Item | Comment |
|---|---|
| **Current price** | The Quarterly Business Indicators Survey provides the basic data for estimating *changes in private non-farm inventories*. This survey actually collects estimates of the closing book value level of inventories from which changes are derived. The levels are also used in deriving the estimates of the inventories to sales ratio that is published in the quarterly national accounts.<br><br>The Quarterly Business Indicators Survey provides the quarterly movements in inventories for mining; manufacturing; wholesale trade; retail trade; electricity and gas; accommodation, cafes and restaurants; and telecommunication.<br><br>The survey does not include some non-farm industries with only minor inventory holdings. For these industries, data are modelled from historical data, which was compiled from the periodic economic censuses and Taxation Statistics using the estimates for in-scope industries. |
| **Chain volume measures** | The most successful means of deriving chain volume changes in inventories has been found to be differencing chained estimates of the levels. The steps involved are as follows:<br><br>1. Re-value quarterly book value levels to levels valued in the prices of the previous year.<br><br>2. Sum to the required level of aggregation.<br><br>3. Calculate quarter to quarter indexes which show the volume growth in levels between the present and previous quarter.<br><br>4. Compound these indexes to form a chained index.<br><br>5. Reference the chained index to the June quarter book value level of the reference year to give a chain volume series of levels.<br><br>6. Difference the resultant values to derive the chain volume estimates of changes in inventories.<br><br>The price indexes that are used to re-value book value levels of inventories are formed by weighting together component price indexes from *Consumer Price Index, Australia* (cat. no. 6401.0), *Price Index of Articles Produced by Manufacturing Industry, Australia* (cat. no. 6412.0), *Import Price Index, Australia* (cat. no. 6414.0) and *Price Indexes of Materials Used in Manufacturing Industries, Australia* (cat. no. 6411.0), and wage rate indexes from Wage *Price Index, Australia* |

(cat. no. 6345.0). The regimen and weights for these price and wage rate indexes are derived using data from the various censuses and surveys conducted by the ABS.

Chain volume estimates of changes in private non-farm inventories are published in the following detail in the national accounts:

- mining;
- manufacturing;
- wholesale trade;
- retail trade; and
- other non-farm industries.

It is noteworthy that, unlike other national accounts aggregates, quarterly chaining and annual chaining of volumes of changes in inventories produce identical annual chain volume estimates of changes in inventories. This is because chain volume estimates of changes in inventories are derived by differencing the chain volume estimates of the levels of inventories which relate to the end of quarterly and annual periods and coincide for the June quarter.

Table 10.56 QUARTERLY CHANGES IN INVENTORIES—Farm inventories

| Item | Comment |
|---|---|
| **Current price** | Changes in farm inventories include changes in<br>• inventories held on farms (including wool, wheat, barley, oats, maize, sorghum, hay, fertiliser, apples and pears, and livestock);<br>• wool held in store awaiting sale; and<br>• produce (e.g. vegetables) held in cold store where ownership remains with the primary producer.<br>Quarterly changes in the book value of inventories of wool are estimated as the difference between inventory levels derived from available information obtained from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities*, Australian Wool Exchange and also from various ABS agricultural statistics. Quarterly changes in the book value of inventories of apples and pears are estimated as the difference between inventory levels, which was modelled from historical data, provided monthly by the Tasmanian Department of Agriculture.<br>In general, animals reared for slaughter are regarded as work-in-progress. The estimates are derived from numbers of sheep and beef cattle collected annually by the ABS and prices from Australian Bureau of Agricultural and Resource Economics and Sciences. Animals reared for breeding purposes or recurrent production (such as dairy cattle and sheep reared for wool production) are regarded as gross fixed capital formation. |
| **Chain volume measures** | The techniques used to calculate chain volume estimates of changes in farm inventories are only slightly different to those shown above for private non-farm. The difference is that for many of the detailed components of the former it is difficult to obtain true book value levels. Therefore, constant price estimates of changes in inventories that preceded the introduction of chain volume estimates are used in the calculations.<br>The steps followed are: |

1. Derive constant price levels of inventories for each component by accumulating the constant price changes over time and add these to a base level (i.e. the level at a particular time for which there is an estimate). The base level is often only an approximation of the true level and is sometimes only derived as a figure which will ensure that subsequent levels remain positive. These constant price levels are then converted to levels valued in the prices of the previous year.

2. Sum to the required level of aggregation.

3. Calculate quarter to quarter indexes which show the volume growth in levels between the present and previous quarter.

4. Compound these indexes to form a chained index.

5. Reference the chained index to the June quarter book value level of the reference year to give a chain volume series of levels.

6. Difference the resultant values to derive the chain volume estimates of changes in inventories.

For farm commodities the price indexes used to convert constant price levels into levels valued in the prices of the previous year are calculated using production unit values.

Table 10.57 QUARTERLY CHANGES IN INVENTORIES—Public authority inventories

| Item | Comment |
|---|---|
| **Current price** | Changes in public authorities' inventories include estimates for general government, public non-financial corporations and public financial corporations.<br><br>Quarterly estimates of changes in the book value of marketing authorities' inventories are derived from information supplied by the authorities concerned.<br><br>Recorded inventories include demonetised gold transactions (gold sales and gold loans) by the Reserve Bank of Australia and the construction of military equipment for export.<br><br>Quarterly data are obtained from ABS Government Finance Statistics and Balance of Payments quarterly collections covering all significant public corporations/organisations and from the Department of Finance and Deregulation's Quarterly Ledger. |
| **Chain volume measures** | The techniques used to calculate chain volume estimates of changes in public authority inventories are only slightly different to those shown above for private non-farm. The difference is that for many of the detailed components of the former it is difficult to obtain true book value levels. Use is therefore made of the constant price estimates of changes in inventories that preceded the introduction of chain volume estimates and which are still calculated.<br><br>The steps followed are:<br><br>1. Derive constant price levels of inventories for each component by accumulating the constant price changes over time and add these to a base level (i.e. the level at a particular time for which there is an estimate). The base level is often only an |

approximation of the true level and is sometimes only derived as a figure which will ensure that subsequent levels remain positive. These constant price levels are then converted to levels valued in the prices of the previous year.

2. Sum to the required level of aggregation.

3. Calculate quarter to quarter indexes which show the volume growth in levels between the present and previous quarter.

4. Compound these indexes to form a chained index.

5. Reference the chained index to the June quarter book value level of the reference year to give a chain volume series of levels.

6. Difference the resultant values to derive the chain volume estimates of changes in inventories.

For the other public authority inventories component a price index is constructed in a similar way to that described above for private non-farm inventories.

10.127 The IVA is compiled each quarter from survey information, and annual estimates are derived by aggregating the quarterly estimates. The sources and methods relating to each of the major sectoral categories are discussed below.

Table 10.58 QUARTERLY CHANGES IN INVENTORIES—Inventory Valuation Adjustment (IVA)

| Item | Comment |
|---|---|
| **Non-farm inventories** | The book values of private non-farm inventories are disaggregated into 30 industry groups (mining; 15 groups within manufacturing; eight within wholesale trade; retail trade; cafes and restaurants; electricity and gas; construction; transport and storage; and telecommunication).<br><br>The inventories held by manufacturing industries are further split into materials, and work-in-progress plus finished goods, while mining inventories are classified as either materials or finished goods.<br><br>An IVA is derived for each estimation cell in the manner and using the assumptions described in above paragraphs. |
| **Farm inventories** | An IVA is generally not necessary for farm inventories because the values of changes in inventories at average current quarter prices can be estimated directly from detailed quantity and price data.<br><br>However, a special adjustment is required for the estimates of changes in inventories of wheat and wool. The value of changes in inventories for these two commodities is calculated by subtracting from their respective sales the value of receivals. Receivals are valued at the price realised (or expected to be realised on the eventual sale of the commodities received). However, these prices normally differ from the current quarter sale price and, therefore, a production valuation adjustment (PVA) is calculated for these commodities, based on the book value and quantities of inventories and average current quarter prices. As the gross value of farm production (estimated in deriving farm income) is calculated using the value of receivals described above, this PVA is deducted from it in order to estimate farm income on a national accounts basis. |
| **Public authorities inventories** | Due to the relatively low level of inventories and the lack of information on the commodity dissection involved, and the fact that source data are |

already in current prices, no IVA is calculated for other public authority inventories.

## Exports and imports

10.128 In any given period, some of the output of an economy may be acquired by non-residents. Such transactions are classified as exports of goods and services. Similarly, some of the goods and services acquired by residents in a particular period may have been produced by non-residents, rather than produced domestically. These transactions are classified as imports of goods and services.

10.129 The exports and imports series shown in the national accounts are identical to those provided in the balance of payments statistics. (In the balance of payments, exports are labelled 'credits' and imports 'debits'.) The publication *Balance of Payments and International Investment Position, Australia: Concepts, Sources and Methods* (cat. no. 5331.0) provides an extensive description of the concepts, sources and methods for exports and imports statistics.

10.130 As with other transactions recorded in the national accounts, exports and imports are recorded at the time the change in ownership of real assets occurs, or when a service is delivered. This time of recording may not coincide with when payments are made, in which case entries for pre- or post-payments will be recorded in the financial account. In some cases (i.e. gifts or grants) goods and services may be exported or imported (and recorded as such in the national accounts) without a settlement ever being required. In these cases, either a current or capital transfer will be recorded in lieu of an actual payment.

10.131 Assets, such as large modulated mining infrastructure, which incur lengthy construction periods are recorded as progressive change of ownership (i.e. the item is recorded as the importing unit takes ownership of the assets under construction as the individual components are complete). This differs from machinery and equipment imports where the change in ownership is deemed to have occurred once the importer has taken delivery of the asset as fully complete.

10.132 In the various ASNA publications, exports and imports of goods and services are generally shown as a single aggregate. (The main exception is the detailed input and output tables, where exports and imports are broken down by industry of origin or by product group.) In the balance of payments, however, exports and imports are broken down into a number of components. The following shows the main components:

**GOODS AND SERVICES---MAIN COMPONENTS SHOWN IN THE BALANCE OF PAYMENTS**

| | |
|---|---|
| **EXPORTS** | |
| **Goods** | Rural goods |
| | Non-rural goods |
| | Net exports of goods under merchanting |
| | Non-monetary gold |
| **Services** | Manufacturing services on physical inputs owned by others |
| | Maintenance and repair services n.i.e. |
| | Transportation services |
| | Travel services |
| | Other services |
| **IMPORTS** | |
| **Goods** | Consumption goods |
| | Capital goods |
| | Intermediate and other merchandise goods |
| | Non-monetary gold |
| **Services** | Manufacturing services on physical inputs owned by others |
| | Maintenance and repair services n.i.e. |
| | Transportation services |
| | Travel services |
| | Other services |

10.133 The item 'goods' covers transactions involving most movable goods. However, transactions between residents and non-residents in some movable goods are classified as services. The most notable example is goods acquired by travellers, which are classified as travel services.

10.134 Exports and imports of goods are both valued free on board (f.o.b.) at the customs frontier of the exporting country. The f.o.b. price includes the value of distributive services involved in transporting the goods to the customs frontier and in loading the goods onto the carrier. The f.o.b. price does not include distributive services provided in transferring the goods from the customs frontier of the exporting country to the recipient of the goods. If such services are provided on Australia's imports by non-residents they will be recorded as imports of transportation services. If such services are provided by Australian residents on Australia's exports they will be recorded as exports of transportation services.

10.135 The values of exports and imports denominated in foreign currencies are converted into Australian dollars using market rates of exchange. If exporters and importers use derivative instruments to hedge against foreign exchange rate movements, then the cash flows associated with these instruments will be recorded as transactions in derivatives, which are shown in the financial account.

Sources and methods – Annual

**10.136** All of the sources required to compile exports and imports of goods data are available on a quarterly basis. Therefore, the annual estimates are obtained by summing the quarterly estimates.

Sources and methods – Quarterly

10.137 The sources and methods for the export and import of goods and services for both current price estimates and volume estimates are discussed in the tables that follow:

Table 10.59 QUARTERLY EXPORTS AND IMPORTS—Goods

| Item | Comment |
|---|---|
| **Current price estimates** | The primary source for exports and imports general merchandise data is the ABS International Merchandise Trade Statistics (IMTS) which is compiled using administrative by-product information from the Australian Customs and Border Protection Service.<br><br>The coverage, timing and valuation of these statistics are adjusted, as required, to place them on a balance of payments basis. These adjustments are made using data from the Survey of International Transport Enterprises (SITE) and other sources including the Reserve Bank of Australia and the Survey of International Trade in Services (SITS).<br><br>The following adjustments are made:<br><br>• Timing adjustments - to ensure transactions are recorded in the period in which ownership changed, rather than in the period in which the transaction was recorded in IMTS. For example:<br>  • exports and imports of ships and aircraft adjusted to the date on which the business in Australia sells (exports) or takes delivery (imports) where this differs from the date they crossed the customs frontier.<br><br>• Coverage adjustments - goods that do not cross the customs frontier but do change ownership. Examples include:<br>  • large value items of capital equipment such as aircraft, ships and oil rigs subject to finance lease that change ownership between an Australian resident and non-resident but do not cross the customs frontier;<br>  • goods included in IMTS that are not in-scope of |

Balance of Payments goods (e.g. goods exported or imported for processing which do not change ownership);
- goods excluded from IMTS because they are below the value threshold specified for customs documentation;
- goods exported directly from off-shore installations without crossing Australia's custom's frontier;
- goods under merchanting; and
- goods procured in ports.

**Volume estimates**

**Exports**

The chain volume measures for approximately 70% of export commodities are obtained by quantity revaluation using quantity information recorded in the IMTS. The remaining 30% are calculated by deflating current price values using export price indexes. These processes of chain volume compilation can be read in detail in the ABS publication *Spotlight on National Accounts Australia; Measuring Chain Volumes for Exports of Goods & Services* (cat. no. 5202.0).

The ASNA uses the price indexes underlying those published in *Export Price Index, Australia* (cat. no. 6405.0) and *Price Indexes of Articles Produced by Manufacturing Industries, Australia* (cat. no. 6412.0).

The chain volume measures of coverage and timing adjustments, that are made to bring exports as recorded in the IMTS onto the required national accounts/balance of payments basis, are derived using relevant implicit price deflators from the underlying quantity data, or the *Export Price Index, Australia* (cat. no. 6405.0) or a combination of both.

**Imports**

All volume measures are derived by deflating current price values using detailed price indexes.

All but two of the components are deflated using price indexes derived from those underlying the price indexes published in *Import Price Index, Australia* (cat. no. 6414.0). The exceptions are:

- computer equipment - the above-mentioned computer equipment price index from the U.S. Bureau of Economic Analysis; and
- sea transport equipment – a Japanese overseas price index for sea transport equipment adjusted for exchange rate changes.

Table 10.60 QUARTERLY EXPORTS AND IMPORTS—Services

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Transport services** | The principal sources of information on exports and imports of transportation services are the International Merchandise Trade Statistics (IMTS), the Cost, Insurance and Freight/Free on Board model (CIF/FOB) and the Survey of International Trade in Services (SITS).<br><br>The CIF/FOB model is used to compile estimates of imports of freight services with a minor adjustment made for resident freight operators from the SITS. |

The SITS is used to compile all other components of transportation services. However this does experience a lag of one quarter, so projections and other sources are used in the interim.

#### Travel services

The standard component breakdown of travel services is between business and personal travel, with supplementary data for groups of special interest, such as border, seasonal and other short-term workers. Services acquired by persons undertaking study or medical care while outside their territory of residence are also encompassed in travel services.

- Personal travel is separated into two major subcomponents:
  - education related travel – estimates are compiled using the Foreign Students in Australia Model (FSAM) in regards to exports and the Australian Students Overseas Model (ASOM) in regards to imports; and
  - all other personal travel (which includes health related travel) – exports are compiled from the Travel by Foreign Residents Model (TFRM) while imports are compiled from the Travel by Australian Residents Model.
- Business Travel - exports and imports are sourced directly from the Travel by Foreign Residents Model (TFRM) and the Travel by Australian Residents Model (TARM) respectively.

Each of these models provides monthly and quarterly estimates.

#### Other services

The principal source for estimates of exports and imports of other services is the SITS.

The following outlines the main components of other services:

- insurance services - based on a data model (Non-life Insurance Model), of which the main input is the Australian Prudential Regulatory Authority's (APRA) Survey of Insurance Companies and Agents;
- financial services directly measured - the majority are measured using the SITS;
- financial services not directly measured - are derived primarily from two data models, FISIM and the Survey of International Investment (SII). FISIM is used to estimate financial intermediation services indirectly charged on loans and deposits by financial corporations. SII collects information on international investment activity into and out of Australia; and
- government services - the Defence Department Australia provides data on services utilised by foreign bases in Australia whilst periodic data about foreign embassies is collected from the Department of Foreign Affairs and Trade and used to estimate embassies' imports of services.

### Volume estimates

#### Exports

Volume measures are obtained mainly by deflation of the current price values, using relevant ABS price indexes underlying those published in

- *Consumer Price Index, Australia* (cat. no. 6401.0);
- *Price Indexes of Articles Produced by Manufacturing Industries, Australia* (cat. no. 6412.0);
- *Award Rates of Pay Indexes, Australia* (cat. no. 6312.0) up until March quarter 1998; and
- from June quarter 1998, Wage *Price Index, Australia* (cat. no.

| | |
|---|---|
| | 6345.0). |
| | In addition, some special purpose price indexes are used. |
| | Quantity revaluation is used for some transportation services, where it is assumed that the volume of transportation services moves in the same way as the volume of the goods being transported. |
| **Imports** | In most cases, volume measures are derived by deflating current price values using consumer price indexes from overseas countries, adjusted for exchange rate changes. |
| | In other cases, special purpose price indexes, implicit price deflators and ABS price indexes from *Consumer Price Index, Australia* (cat. no. 6401.0) and *Import Price Index, Australia* (cat. no. 6414.0) are used. |

# CHAPTER 11 GROSS DOMESTIC PRODUCT - INCOME APPROACH (GDP(I))

## COMPONENTS OF GDP(I)

11.1 GDP can be measured by the sum of income flows. The sum of factor incomes plus taxes less subsidies on production and imports gives GDP at purchaser's prices measured by the income approach (GDP(I)). That is

| | | |
|---|---|---|
| *GDP(I)* | = | *Compensation of employees* |
| | + | *Gross operating surplus* |
| | + | *Gross mixed income* |
| | + | *Taxes on production and imports* |
| | - | *Subsidies on production and imports* |

11.2 Gross value added at basic prices, less taxes on production and imports plus subsidies on production and imports (conventionally combined as taxes less subsidies on production and imports) represents the amount available as factor incomes. Factor incomes consist of compensation of employees (the income of the labour factor of production), operating surplus (the income of the entrepreneurship factor of production), or mixed income (a combination of compensation of employees and operating surplus accruing to the owners of unincorporated enterprises).

11.3 It is important to determine whether a person is an employee or self-employed so that the correct treatment of their income is applied as well as the sub-sectoring of the household sector. In order to be classified as employed, i.e. either as an employee or self-employed, the person must engage in activity which falls within the production boundary. An employer-employee relationship exists when there is a written or oral agreement, entered into voluntarily by the parties, whereby the person works for the enterprise in return for remuneration in cash or in kind. Self-employed persons work for themselves, are joint owners of unincorporated enterprises, or members of a producers' co-operative. The remuneration of the self-employed is treated as mixed income.

11.4 Employees are defined as all persons engaged in the activities of incorporated business units, in the production of general government services and the services of non-profit organisations, members of the defence forces (including reserves and cadets) based in Australia as well as those stationed overseas, and all persons engaged in the activities of unincorporated enterprises except the proprietors and unpaid members of the family. Trainee teachers are deemed to be outside the labour force, and so payments to them are excluded from wages and salaries and included instead as social assistance benefits.

11.5 In the case of a contractor it is necessary to determine the working relationship between the parties. This is not always straightforward and several issues need to be taken into account, such as how the remuneration/payment for work is determined, and the existence/non-existence of a contract.

### Compensation of employees

#### Concept

11.6 2008 SNA (paragraph 7.5) defines compensation of employees as follows:

> "*... the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the latter during the accounting period.*"

11.7 Compensation of employees comprises wages and salaries (in cash and in kind) and employers' social contributions. It does not include any unpaid work undertaken voluntarily or any taxes payable by the employer on the wage and salary bill such as payroll tax.

11.8 *Wages and salaries paid in cash* include the values of any social contributions (e.g. to superannuation funds), income taxes, etc., payable by the employee even if withheld by the employer for administrative convenience, such as direct payment to a superannuation fund or the taxation department. Also included are

penalty payments (e.g. overtime, hazardous work allowances), supplementary allowances such as housing and meal allowances (unless paid as social benefits), holiday pay, payment while on sick leave, bonuses, and commissions, tips and gratuities paid directly to the employee by a third party. Excluded from wages and salaries are reimbursements for expenses incurred (e.g. transportation and accommodation expenses incurred on business travel, and removal expenses) and for equipment or clothing purchased (the reimbursements are treated as intermediate consumption of the employer).

11.9 The imputation made for the employers' social contribution implicitly required to fund future benefit payments from unfunded superannuation schemes is also included. This is the amount which the employer would be required to pay into a separate superannuation fund if the scheme were operated as a fully funded scheme.

11.10 *Wages and salaries paid in kind* covers the cost to an employer of goods and services which are provided to the employee, or to another member of the employee's household, free of charge or at a substantial discount, and which are clearly of benefit to the employee as a consumer. Examples include meals, housing, uniforms that can be worn away from work, vehicles available for personal use, goods and services produced by the employer enterprise, recreational facilities, transportation, car parking, child care, low interest loans and stock options. Some of these benefits may appear more like intermediate consumption, but are included in compensation of employees because, even though they are paid to attract employees, they are benefits that employees would often have to provide themselves.

11.11 Fringe benefits taxes which are payable on income in kind provided to employees are included as part of wages and salaries and also included in income taxes payable by households.

11.12 Payments to members of the defence forces consist of salaries and allowances, attendance pay and the value of food, clothing, and travel supplied to permanent members, reserves and cadets. Deferred pay is included but war gratuities, which are regarded as social assistance benefits, are not.

11.13 The 2008 SNA recommends that severance, termination and redundancy payments by employers; sick leave payments; and payments for other forms of leave other than annual leave and long service leave should be classified as employers' social contributions. However, it acknowledges it may be difficult to separate such payments from wages and salaries and therefore they may have to be grouped with wages and salaries. This is the case in Australia, as data providers are unable to consistently differentiate between these various types of severance and leave payments, and other wage and salary payments. Therefore, these payments are included in the ASNA estimates of wages and salaries.

11.14 Wages and salaries also include changes in provisions for future employee entitlements such as provisions for long service leave.

11.15 *Employers' social contributions* are amounts paid by employers (or imputed as payments by employers) to provide social benefits for employees. Social benefits include retirement benefits such as superannuation. Employer social contributions are usually paid directly by the employer into investment funds (called 'social insurance schemes' in 2008 SNA) operated by a separate financial institution, but can be paid into a fund set up within the employer enterprise. However, in some cases, employers pay the benefits directly from general revenue - where this occurs the employers are said to operate an unfunded social insurance scheme. In such cases, the system calls for employers' social contributions to be imputed as the amount that would have had to be invested to pay for future benefit payments.

11.16 Although employer contributions to funded social insurance schemes are usually paid by employers to the scheme operators, in the national accounts all employers' social contributions (including imputed contributions) are treated as having been paid to employees, who are then treated as having made the payments to the schemes. This treatment is considered more realistic from an economic viewpoint in that the contributions are seen as part of the compensation and income of the employees, who are then seen as using the contributions to acquire access to social insurance schemes (to which they may also contribute directly). The treatment also means that employers' social contributions add to GDP(I).

11.17 There is a minor definitional difference between compensation of employees as a component of GDP (recorded in the gross domestic product account and the national income account) and as an item in the household income account. In the gross domestic product account and the national income account, compensation of employees includes amounts paid by resident producers to non-residents. This income is shown in the external income account as labour income to overseas. To obtain compensation of employees as recorded in the household income account it is necessary to deduct labour income to overseas from the value shown in the gross domestic product account and the national income account and to add labour income from overseas. Labour income from overseas is also shown in the external income account, and comprises labour income paid to residents working for non-resident employers (either in Australia or overseas).

Sources and methods – Annual

*Benchmark years*

11.18 Wages and salaries and employers' social contributions are initially derived at the sector level based on the following data sources:

- General government – based on the Survey of Employment and Earnings (for wages and salaries) and the Survey of Major Labour Costs (for employers' social contributions).
- Non-financial corporations, households and quasi-corporations – based on the Economic Activity Survey.
- Finance and insurance corporations – based on data from the Australian Prudential Regulatory Authority (excluding financial auxiliaries).

11.19 These sectoral estimates are then combined to form the total wages and salaries and employers' social contributions, respectively.

11.20 The tables below outline the data sources and methods used in the estimation of the components of compensation of employees in current prices only. Volume estimates are not calculated for compensation of employees.

Table 11.1 ANNUAL COMPENSATION OF EMPLOYEES—Wages and salaries

| Item | Comment |
|---|---|
| **Non-financial corporations, Households and NPISH's** | The primary data source is from the Economic Activity Survey. Data are obtained at the ANZSIC class level and are subsequently aggregated to the Supply-Use Industry Classification (SUIC) level. The SUIC aggregation is mostly at the subdivision level of ANZSIC but there are instances where it is at the group or division level.<br><br>Estimates for total annual payments in kind (PIK) for Australia are derived using the Survey of Major Labour Costs (SMLC) data. As the SMLC is not run each year, the annual estimates are based on movements in the Australian Taxation Office (ATO) fringe benefits tax data and forecasts from Commonwealth budget papers when ATO data are not available.<br><br>The SMLC is used to split the PIK estimates between the Public Sector (general government plus public non-financial corporations) and the Private Sector (All other sectors) and disaggregate the private sector estimates to industry level.<br><br>Estimates of wages and salaries in cash and PIK are summed to form the wages and salaries estimates by industry |
| **Financial corporations** | For the Finance and Insurance and Superannuation Funds industries, an estimate of financial corporation wages and salaries is obtained from the SMLC. For years where SMLC data are not available the annual estimate is based on data from the Australian Prudential Regulatory Authority (APRA) and the Quarterly Business Indicators Survey.<br><br>For the Auxiliary Finance and Insurance Services industry, an estimate of financial corporation wages and salaries is obtained from the Economic Activity Survey. |
| **General Government** | A base estimate of general government wages and salaries is obtained from the Survey of Employment and Earnings. To this an estimate for overseas general government staff wages and salaries is added. This estimate is based on data received from the Department of Foreign Affairs. |

| | |
|---|---|
| | The estimate is then disaggregated to industry level using weights derived from general government output by industry. An estimate for wages and salaries of defence personnel is obtained from Government Finance Statistics and is used to replace the value calculated for the Defence industry from the Survey of Employment and Earnings, as defence is partially outside the scope of the Survey of Employment and Earnings.<br><br>Estimates for total annual payments in kind (PIK) for Australia are derived using the Survey of Major Labour Costs (SMLC) data. As the SMLC is not run each year, the annual estimates are based on movements in the Australian Taxation Office (ATO) fringe benefits tax data and forecasts from Commonwealth budget papers when ATO data are not available.<br><br>The estimates for wages and salaries and PIK are summed and disaggregated to industry level, based on weights derived from general government output. |

Table 11.2 ANNUAL COMPENSATION OF EMPLOYEES—Employer social contributions

| Item | Comment |
|---|---|
| **Non-financial corporations, Households and NPISHs** | Estimates of superannuation contributions and workers' compensation payments by non-financial corporations, households and NPISH enterprises are obtained from the Economic Activity Survey. The two collected data items are summed together to form employer social contributions (ESC) by industry, which is further aggregated to the Supply-Use Industry Classification (SUIC) level. The SUIC aggregation is mostly at the subdivision level of ANZSIC but there are instances where it is at the group or division level. |
| **Financial corporations** | An estimate of financial corporations' ESC is obtained by combining the ESC reported by the various major financial institutions, obtained from annual reports and the Australian Prudential Regulatory Authority, and rolling forward the previous years' estimates with their movements. The previous year's estimates for services to finance and insurance are rolled forward using movements provided by the Quarterly Business Indicators Survey. |
| **General Government** | Estimates of superannuation contributions and workers' compensation payments by general government enterprises are based on data obtained from the Survey of Major Labour Costs. The two data items are summed together to form the ESC.<br><br>This aggregate is then disaggregated to industry level using weights of general government output, except for ANZSIC Division O (Public Administration and Safety). ANZSIC Division O uses weights based on the wages and salaries (due to the impact of a separate calculation for defence) to derive an estimate for general government ESC. |

*Latest year*

11.21 Annual estimates for the latest financial year for wages and salaries and employers' social contributions for Australia and by State (State estimates are covered in more detail in the State Accounts chapter), are derived by extrapolating the latest supply and use benchmark (year t-1) using the movements in the quarterly estimates for that financial year.

11.22 The industry estimates for wages and salaries in the latest year are derived by extrapolating the latest supply and use industry benchmarks (year t-1) using movements in hourly rates from the Wage Price Index in conjunction with Labour Force Survey (LFS) data. ANZSIC Division O (Public Administration and Safety) includes defence personnel and staff in Australian embassies and consulates situated overseas.

11.23 The industry estimates of employers' social contributions for the latest year are derived by extrapolating the latest supply and use industry benchmarks (year t-1) using movements in the Average weekly earnings and LFS data. The ANZSIC Division O base estimate is derived using movements from the Government Finance Statistics general government superannuation and workers' compensation value.

Sources and methods – Quarterly

11.24 Quarterly estimates of compensation of employees are built up from the State and Territory level by various subcomponents of wages and salaries and employers' social contributions.

11.25 The following tables outline the data sources and method used in the quarterly estimation of the components of compensation of employees in current prices only. Volume estimates are not calculated for compensation of employees.

Table 11.3 QUARTERLY COMPENSATION OF EMPLOYEES—Wages and salaries

| Item | Comment |
|---|---|
| **General approach** | Quarterly estimates of wages and salaries (including payments in kind) for annually benchmarked years are obtained for the private and public sectors for each State and Territory by distributing the total annual estimates according to the previously calculated quarterly distribution of:<br>• private (farm plus non-farm) wages and salaries; and<br>• public (civilian plus defence plus payments to staff of Australian embassies and consulates overseas) wages and salaries.<br><br>For the latest year, the quarterly estimates of wages and salaries are calculated by extrapolating the latest quarterly estimates that have been benchmarked to an overall annual level by the following subcomponents. |
| **Private non-agricultural employees and civilian employees of the public sector paid in cash and kind** | For private non-farm, Quarterly Business Indicators Survey data are used to move forward the latest estimate of wages and salaries. For the civilian component of public sector, Government Finance Statistics data are used to move forward the latest estimate of wages and salaries. |
| **Agricultural employees** | The Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication provides details of farm costs and returns and labour data which are used to move forward the latest estimate of wages and salaries. |
| **Payments to members of the defence forces** | Government Finance Statistics data, which are based on estimates received from the Department of Finance and Deregulation, are used to move forward the latest estimate of wages and salaries. |

Table 11.4 QUARTERLY COMPENSATION OF EMPLOYEES—Employer social contributions

| Item | Comment |
|---|---|
| **General approach** | The quarterly estimates of employers' social contributions are calculated by extrapolating the latest quarterly estimates that have been benchmarked to an overall annual level by the following subcomponents. |
| **Private employers' contributions to superannuation** | Quarterly Business Indicators Survey data are used to move forward the latest annual benchmark estimate of private employers' contributions to superannuation. |
| **Public employers' contributions to superannuation** | Government Finance Statistics data are used to move forward the latest annual benchmark estimate of public employers' contributions to superannuation. |
| **Private workers' compensation premiums paid** | Quarterly Business Indicators Survey data are used to move forward the latest annual benchmark estimate of private workers' compensation premiums paid. |
| **Public workers' compensation premiums paid** | Government Finance Statistics data are used to move forward the latest annual benchmark estimate of public workers' compensation premiums paid. |

## Operating surplus and mixed income

### Concept

11.26 Operating surplus is the income from production of corporate enterprises, while mixed income is the income from production of unincorporated enterprises. Both operating surplus and mixed income are measured prior to deducting any explicit or implicit interest charges, rent or other property incomes payable on the financial assets, land or other natural resources required to carry on production.

11.27 The term 'mixed income' is used because the surplus arising from the productive activities of unincorporated enterprises can comprise returns to the capital of the proprietors (representing operating surplus), and an element akin to wages and salaries accruing to the proprietors or other members of the household as payment for their labour input to the enterprise (even though they may not receive explicit payment for their work).

11.28 Operating surplus and mixed income can be measured on a gross or net basis. Gross operating surplus and gross mixed income are defined as gross value added minus compensation of employees, minus taxes payable plus subsidies receivable on production and imports. Gross operating surplus (GOS) represents the gross income derived by corporations, both financial and non-financial, dwellings owned by persons and general government. In the case of general government, gross operating surplus represents only consumption of fixed capital. Gross mixed income (GMI) represents the gross income derived by unincorporated enterprises.

11.29 Net operating surplus is equal to gross operating surplus less consumption of fixed capital, and net mixed income is equal to gross mixed income less consumption of fixed capital.

11.30 Estimates of GOS and GMI are compiled by institutional sector, namely:

- GOS - private non-financial corporations;
- GOS - public non-financial corporations;
- GMI - unincorporated enterprises;
- GOS - dwellings owned by persons;
- GOS - general government; and
- GOS - financial corporations.

Sources and methods – Annual

*Benchmark years*

11.31 Annual benchmark estimates for GOS and GMI are derived in total for all institutional sectors. It involves two stages where the first is to derive GOS/GMI in total for all industries. This is undertaken within the supply and use tables.

11.32 The second stage is to split total GOS/GMI into the remaining institutional sectors which requires GMI to be separately identified. The steps required to do this are as follows:

a. Remove estimated GOS for public non-financial corporations, financial corporations and general government sectors, and dwellings owned by persons from total GOS/GMI.

b. Derive non-farm private non-financial corporations GOS plus non-farm GMI in total.

c. Disaggregate total farm GOS/GMI into components for farm GOS and farm GMI.

d. Disaggregate total non-farm GOS/GMI into components for non-farm GOS and non-farm GMI.

e. Add non-farm private non-financial corporations GOS (from step d) to farm GOS (from step c), and non-farm GMI (from step d) to farm GMI (from step c).

11.33 The tables below outline the data sources and methods used in the estimation of annual GOS and GMI in total (as per stage 1) and then the institutional sector split as per stage 2 following the steps outlined above. GOS and GMI are estimated in current prices only. Volume estimates are not calculated for GOS and GMI.

Table 11.5 ANNUAL GROSS OPERATING SURPLUS AND GROSS MIXED INCOME—Stage 1: Total for all industries except Finance (subdivision 62), Insurance and superannuation funds (subdivision 63), Auxiliary finance and insurance services (subdivision 64), Health and social assistance (Division Q) and General Government sector

| Item | Comment |
|---|---|
| **Total Gross Operating Surplus/Gross Mixed Income (GOS/GMI)** | Annual benchmarks for GOS and GMI of private non-financial corporations, unincorporated enterprises and private financial corporations providing finance and insurance services are derived from the Economic Activity Survey, using the following calculation:<br>GOS/GMI =<br>Output<br>*less* Intermediate consumption<br>*less* Compensation of employees<br>*less* Other taxes on production<br>*plus* Other subsidies on production.<br><br>Note also the GOS for NPISH units is depreciation as reported in the Economic Activity Survey. This is a proxy for consumption of fixed capital which is conceptually the GOS for the NPISH sector. The Perpetual Inventory Model which provides estimates of COFC does not distinguish between household and NPISH sectors.<br><br>NPISH GOS is calculated as gross output less the costs incurred in producing that output (but before deducting consumption of fixed capital), leaving consumption of fixed capital (COFC) as the residual. |

Table 11.6 ANNUAL GROSS OPERATING SURPLUS—Stage 1: Finance services (subdivision 62)

| Item | Comment |
|---|---|
| **Financial corporations and quasi-corporations - Concept** | GOS of financial corporations is the excess of gross output over the costs incurred in producing that output for all financial corporations in Australia. However, unlike non-financial corporations, whose gross output can generally be equated with the proceeds of the sales of goods and services, explicit charges for services account for only a small proportion of the income of financial corporations. |
| **Finance services** | Banks and similar financial intermediaries largely finance their activities by the excess of interest received over interest paid. If GOS were calculated in the same way as for other institutional sectors, it would be negative because only explicit service charges and operating expenses would be taken into account. In the national accounts, interest received is not considered to be part of income from production, and likewise interest paid is not part of expenses incurred in deriving income from production. The approach adopted in 2008 SNA and the ASNA is to include the indirect charges as imputed service charges in addition to any actual charges which are made by these financial corporations, and to include it in the calculation of GOS. The imputed service charge is entitled financial intermediation services indirectly measured (FISIM).<br><br>Financial intermediaries such as investment funds earn net income from their dividends and reinvested earnings. In the national accounts, dividends and reinvested earnings are not considered to be part of income from production, but part of property income recorded in the income accounts. The investment funds distribute all the net income to the investors of the funds. The ASNA imputes an output for these funds equal to the cost of running the fund (total administrative and investment expenses) less any income derived directly, with an assumption that the GOS for these funds equals zero.<br><br>Balance sheet, income and expenditure and interest rate information are used to compile GOS for the following financial intermediaries – the Reserve Bank of Australia (RBA); banks; other depository corporations (credit unions, building societies, cash management trusts, registered financial corporations); central borrowing authorities; securitisers and financial intermediaries not elsewhere classified (e.g. public unit trusts excluding property trusts; public development authorities; investment companies; common funds; co-operative housing societies; public housing schemes; and other financial corporations). |
| Data sources | The following outlines the data sources used to estimate the various components of output:<br><u>Balance sheets:</u><br>• ABS, *Australian National Accounts, Financial Accounts* (cat. no. 5232.0);<br>• Australian Prudential Regulatory Authority (APRA) *Monthly Bank Statement of Financial Position*- detailed breakdown for bank loans and deposits;<br>• ABS, *Assets and Liabilities of Australian Securitisers* (cat. no. 5232.0.55.001);<br>• ABS, *Managed Funds, Australia* (cat. no. 5655.0);<br>• Reserve Bank of Australia (RBA) *Statistical Bulletin*; and<br>• ABS, Capital stock estimates from *Australian System of National Accounts* (cat. no. 5204.0).<br><br><u>Income and expenditure</u>:<br>• RBA: *Annual Report*; *Financial Stability Report* (6 monthly); *Statement of Monetary Policy* (quarterly)<br>• ABS: *Balance of Payments and International Investment* |

*Position, Australia* (cat. no. 5302.0); *Statistics of Financial Institutions* (cat. no. 5661.0) (note: cat. no. 5661.0 has ceased but for completeness it is included as the data in this publication still underpins the estimates);
- ABS Collections - Economic Activity Survey; Quarterly Survey of Financial Information, Government Finance Statistics;
- Suite of APRA forms - *Quarterly Bank Statement of Financial Performance* and *Quarterly Registered Financial Corporations Statement of Financial Performance;*
- APRA publications: *Quarterly Banks, Building Societies and Credit Unions Performance Statistics*; and
- Ad-hoc reports: annual reports for small subsectors such as listed investment companies, bank annual reports and private consultant banking reports.

Interest rates:
- RBA *Statistical Bulletin.*

GOS derivation

GOS is calculated as:

FISIM imputation
*plus* imputed output of financial intermediaries not elsewhere classified
*plus* imputed output of RBA
*plus* explicit charges of financial institutions
*plus* gross non-land rent and other service income (excludes property income)
*plus* non-life insurance premiums (payable by financial corporations)
*less* expenses (excluding consumption of fixed capital)
*less* FISIM (payable by financial corporations)
*less* non-life insurance service charge (payable by financial corporations).

The following adjustment is also included to obtain GOS:

- Own account computer software and R&D.

Note that profits and losses on foreign exchange dealings are excluded from GOS because they constitute holding gains and losses in the national accounts.

The difference between buying and selling rates and mid-point exchange rates is treated as a service charge.

FISIM imputation

To compile the FISIM imputation estimate for all financial intermediaries (except the Reserve Bank of Australia and financial intermediaries n.e.c.), total interest receivable and payable estimates by financial instruments (i.e. deposits, bills of exchange, one-name paper, bonds and loans) and counterparty sector and subsector flows are compiled for the following six sectors and subsectors:

- Rest of the world;
- Reserve Bank of Australia;
- Banks;
- Other depository corporations;
- Central borrowing authorities; and
- Securitisers.

Three datasets are required to compile the interest flows, namely:

- total interest payable and receivable;

- interest rates for relevant financial instruments of various sectors and subsectors; and
- financial assets and liabilities for the six sectors and subsectors.

The next step is to calculate FISIM for loans and deposits (banks and other depository corporations) and for loans (securitisers and central borrowing authorities).

- For banks and other depository corporations, FISIM is derived as follows:

*[(counterparty loan rate - reference rate)*counterparty stock of loans] + [(reference rate - counterparty deposit rate)*counterparty stock of deposits],*
where reference rate is mid-point between the average interest rate on loans and the average interest rate on deposits.

- For securitisers and central borrowing authorities, FISIM is derived as follows:

*[(counterparty loan rate - reference rate)*counterparty stock of loans],* where reference rate is weighted average bond yield.

The above calculations are undertaken in separate loan and deposit FISIM tables for each of the four FISIM generating institutions. Each table captures the counterparty sector and subsector loan and deposit balances, their respective interest flows and interest margins and the subsequent FISIM estimates.

Imputed output of the Reserve Bank of Australia (RBA)

The ASNA has divided the activity of the RBA into two types:
- monetary policy and other non-market services, where a cost based output measure is imputed; and
- financial market operations of the RBA, where output in the form of explicit charges is earned on activities such as its daily repurchase (lending) program. This part of the RBA would generate a GOS as its gross output would exceed costs.

Imputed output of financial intermediaries not elsewhere classified

In ASNA, the estimate for an imputed output for units in this subsector is equal to the cost of running the business (total administrative and investment expenses) less any income derived directly, i.e. the GOS for these funds equals zero. The majority of units in this subsector are investment funds, where the distributed surplus of the funds is measured as dividends and re-invested earnings and so is recorded as property income in the income accounts. The rest of the units are public sector units and are measured at cost.

Explicit charges

Explicit charges refer to direct charges levied e.g. loan establishment fees, loan account service fees and cheque account fees. Finance lease receipts are not classified as direct charges, in accordance with the treatment of finance leases in the ASNA.

Gross non-land rent and other service income

Rental income is predominantly from commercial buildings and infrastructure. Other service income includes income made on trading in securities, excluding holding gains and losses on these activities.

Expenses

Expenses include wages and salaries, purchases of goods and services, and taxes on production and imports.

Also included as expenses are the imputed services for both FISIM and non-life insurance attributable to corporations in the financial

corporations sector, which need to be deducted as a component of intermediate consumption.

As business accounts of these financial corporations would have already included non-life insurance premiums as expenses rather than according to the 2008 SNA concept of the insurance service charge, it is necessary to add back the premium payments.

An adjustment is also required to ensure that all expenditure on research and development and expenditure on software of a capital nature are capitalised rather than being deducted as current expenses.

Table 11.7 ANNUAL GROSS OPERATING SURPLUS—Stage 1: Insurance and pension funds (subdivision 63)

| Item | Comment |
|---|---|
| **Insurance corporations and pension funds - Concept** | GOS of financial corporations is the excess of gross output over the costs incurred in producing that output for all financial corporations in Australia. However, unlike non-financial corporations, whose gross output can generally be equated with the proceeds of the sales of goods and services, explicit charges for services account for only a small proportion of the income of financial corporations. |
| **Insurance and pension fund services** | Non-life insurance corporations do not identify an explicit service charge as part of their premiums. However, their premiums can be regarded as being composed of two components: an implicit service charge, and a transfer payment to cover the risk of providing insurance cover.<br><br>The non-life insurance service charge is defined as premiums earned plus premium supplements less expected claims.<br><br>Premiums earned include direct premiums earned plus inward reinsurance premiums less outward insurance premiums and statutory charges paid. The item represents the amount of premium income earned during the financial year and includes movements in the unearned premium provision.<br><br>Premium supplements represent income earned on the technical reserves of non-life insurance corporations, which consist of unearned premiums (most premiums are paid for a full year in advance), and claims incurred but not yet paid (which arise because of delays in claims being lodged and assessed, and in finalising the payment of claims).<br><br>Premium supplements do not include any income from the investment of the insurance corporations' own funds. As the technical reserves are considered to be assets of the insurance policy-holders, the investment income receivable by insurance enterprises must be shown in the accounts as being paid by the insurance enterprises to the policy-holders. However, in practice this income is retained by the insurance enterprises. Therefore, it is treated as being paid back to the insurance enterprises in the form of premium supplements that are additional to actual premiums payable under the terms of the insurance policies.<br><br>In the case of workers' compensation it is the worker who is regarded as the policy-holder for the purposes of attributing the imputed property income earned on the insurance companies' technical reserves, not the employer. Although the employer is legally the policy-holder for workers' compensation, for national accounts purposes the employer is deemed to be acting on behalf of the employee in paying workers' compensation premiums. Consequently, workers' compensation premiums are included as part of employers' social contributions, which is a component of compensation of employees. |

Expected claims are generally defined as a centred five year moving average of claims incurred. A moving average is used to avoid irregular movements in the non-life insurance service charge which would otherwise arise because of volatility in the annual data for claims incurred.

For pension funds the insurance service charge is equal to the cost of running the fund; included are administrative and investment expenses.

For life insurance and friendly societies, the insurance service charge is equal to the cost of running the business plus a profit margin. The profit margin is calculated by estimating a proxy return on equity.

Data sources

Balance sheet and income and expenditure data are used to compile the GOS for pension funds (superannuation), life insurance corporations (including friendly societies) and non-life (general) insurance corporations.

Balance sheets:

- ABS, *Australian National Accounts, Financial Accounts* (cat. no. 5232.0);
- ABS, *Managed Funds, Australia* (cat. no. 5655.0); and
- ABS, Capital stock estimates from the *Australian System of National Accounts* (cat. no. 5204.0).

Income and expenditure:

- ABS Collections - Quarterly Survey of Financial Information;
- APRA form - *Quarterly Superannuation Statement of Financial Performance*;
- APRA publications: *Quarterly Superannuation, Life Insurance and General Insurance Performance Statistics; Annual Superannuation and Friendly Society Bulletins; Half Yearly General Insurance Bulletin and Selected Statistics on General Insurance;*
- ATO: Self-managed superannuation funds taxation data and website releases;
- ABS Publications: *Balance of Payments and International Investment Position, Australia* (cat. no. 5302.0); *and*
- Ad-hoc private consultant reports: superannuation actuarial reports and real estate statistics.

GOS derivation

GOS is calculated as:

Insurance service charge (ISC)
*plus* explicit charges
*plus* gross non-land rent (excludes property income)
*plus* non-life insurance business income plus subsidies
*plus* non-life insurance premiums (payable by financial corporations)
*less* expenses (excluding COFC)
*less* FISIM (payable by financial corporations)
*less* non-life insurance service charge (payable by financial corporations).

The following adjustment is also included to obtain GOS:

- Own account computer software and R&D.

Insurance service charge

Non-life insurance corporations – the ISC is estimated as premiums earned plus investment income on the technical reserves less expected claims:

- premiums earned include direct premiums earned plus inward reinsurance premiums less outward insurance premiums and statutory charges paid;
- premium supplements represent income earned on the technical reserves of non-life insurance corporations, which consist of unearned premiums (most premiums are paid for a

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| | full year in advance), and claims incurred but not yet paid (which arise because of delays in claims being lodged and assessed, and in finalising the payment of claims);<br>• premium supplements do not include any income from the investment of the insurance corporations' own funds. The proportion of policy-holders funds to total assets of non-life insurance corporations is applied to total investment income to derive premium supplements.<br><br>Life insurance corporations – the ISC is the sum of administrative costs incurred (including investment and labour costs) plus a profit margin. The profit margin is calculated by estimating a proxy return on equity.<br><br>Pension funds – the ISC is the sum of administrative costs incurred (including investment and labour costs). |
| Explicit charges | Explicit charges include fees from stock lending activities. |
| Gross non-land rent (excludes property income) | Rental income is predominantly from commercial buildings and infrastructure. Other service income includes income made on trading in securities, excluding holding gains and losses on these activities. |
| Expenses | Expenses include wages and salaries, purchases of goods and services, and taxes on production and imports.<br><br>Also included as expenses are the imputed services for both FISIM and non-life insurance attributable to corporations in the financial corporations sector.<br><br>However, as business accounts of these financial corporations would have already included non-life insurance premiums as expenses and not the 2008 SNA concept of the insurance service charge, it is necessary to add back the premium payments.<br><br>An adjustment is also required to ensure that all expenditure on research and development and expenditure on software of a capital nature are capitalised rather than being deducted as a current expense. |

Table 11.8 ANNUAL GROSS OPERATING SURPLUS—Stage 1: Auxiliary finance and insurance services (subdivision 64)

| Item | Comment |
|---|---|
| **Auxiliary finance and insurance services** | Annual benchmarks for GOS of Auxiliary finance and insurance services are derived from the Economic Activity Survey, using the following calculation:<br><br>Output<br>*less* Intermediate consumption<br>*less* Compensation of employees<br>*less* Other taxes on production<br>*plus* Other subsidies on production. |

Table 11.9 ANNUAL GROSS OPERATING SURPLUS—Stage 1: Health care and social assistance, division Q

| Item | Comment |
|---|---|
| **Health care and social assistance** | Annual benchmarks for GOS of the Health industry are derived from the sum of the four quarters. |

Table 11.10 ANNUAL GROSS OPERATING SURPLUS—Stage 1: General government

| Item | Comment |
|---|---|
| **General Government** | General government GOS is equivalent to the value of consumption of fixed capital on general government assets. By convention, the value of general government gross output is measured as the cost of producing that output, including consumption of fixed capital.<br><br>GOS is calculated as gross output less the costs incurred in producing that output (but before deducting consumption of fixed capital), leaving consumption of fixed capital as the residual.<br><br>Consumption of fixed capital at current prices for general government is derived using the Perpetual inventory model (PIM). |

Table 11.11 ANNUAL GROSS OPERATING SURPLUS —Stage 2a: Public non-financial corporations and quasi-corporations

| Item | Comment |
|---|---|
| **Public non-financial corporations and quasi-corporations** | The estimates of public non-financial corporations GOS are based on data from Government Finance Statistics, which are compiled using annual financial statements obtained from all Commonwealth and State Treasuries along with annual reports of corporations and quasi-corporations.<br><br>The following adjustments are made:<br>• deduct FISIM;<br>• deduct insurance service charge (ISC); and<br>• add the capitalised component of expenditure on R&D. |

Table 11.12 ANNUAL GROSS OPERATING SURPLUS —Stage 2a: Financial corporations and quasi-corporations

| Item | Comment |
|---|---|
| **Financial corporations** | Sum of the GOS for financial services (subdivision 62), insurance services (subdivision 63) and financial auxiliaries (subdivision 64) as described in the tables above. |

Table 11.13 ANNUAL GROSS OPERATING SURPLUS— Stage 2a: Dwellings owned by persons

| Item | Comment |
|---|---|
| **Dwellings owned by persons** | GOS for ownership of dwellings is derived as:<br><br>Output at basic prices<br>*less* intermediate consumption<br>*less* other taxes on production.<br><br>An estimate of GOS for dwellings owned by sectors other than households is deducted to obtain GOS for dwellings owned by persons.<br><br>The sources for estimating GOS relating to ownership of dwellings by other sectors are:<br>• public non-financial corporations sector - derived from Government Finance Statistics; |

- general government - equal to consumption of fixed capital of dwellings for general government sector; and
- private non-financial corporations - derived using benchmark data from past Surveys of Interest, Rent, Royalties and Dividends.

**Output at basic prices**

The output estimate is equivalent to the estimate of household final consumption expenditure on imputed rentals for housing plus the actual rental on housing. No further adjustments are made.

The data sources and methods used to compile annual estimates of imputed rentals on housing and actual rental on housing are described in Table 8.78 ANNUAL HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Housing, water, electricity, gas and other fuels.

**Intermediate consumption**

Intermediate use related to GOS for dwellings owned by persons include:

- repairs and maintenance;
- building insurance;
- FISIM;
- real estate agent commissions charged for the management of rental properties, loan application fees and other direct charges by financial corporations; and
- miscellaneous expenses.

*Repairs and maintenance*

Repairs and maintenance are benchmarked from the periodic Household Expenditure Survey. The benchmarks are extrapolated using a combined indicator based on the estimated number of dwellings (the same estimate as used to estimate total dwelling rent) and movements in appropriate component price indexes from the CPI.

In this context repairs and maintenance cover the actual repairs to the dwelling and preventative maintenance such as painting internal and external surfaces. However, purchases of goods and services associated with cleaning a dwelling are included in household final consumption expenditure.

*Building insurance*

Estimates for building insurance service charge (premiums plus premium supplements less expected claims) are derived from annual data published by the Australian Prudential Regulatory Authority (APRA).

*FISIM*

FISIM comprises the imputed service charge component of interest payable on loans used to finance the purchase of dwellings by persons.

*Real estate management fees*

Estimates for real estate agents' management fees are derived using data from the Census of Population and Housing to estimate the proportion of rented dwellings managed by real estate agents, extrapolated by the number of rented dwellings for non-Census years. This proportion is applied to actual rent and multiplied by the average commission rate for each state.

*Loan application fees*

Estimates for loan application fees and other direct financial charges associated with dwellings are obtained from APRA.

*Miscellaneous expenses*

Estimates for miscellaneous expenses are derived as a percentage of actual rents and imputed rents.

**Other taxes on production**

Other taxes on production include:

- municipal rates; and
- land tax on residential land.

*Municipal rates*

General municipal rates are benchmarked from the periodic Household

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| | Expenditure Survey. The benchmarks are extrapolated using an indicator based on the Metropolitan and Municipal Improvement Rates series from the ABS publication *Government Finance Statistics, Australia* (cat. no. 5512.0). |
| *Land tax* | Estimates for land tax on residential land are based on data from Government Finance Statistics and State Treasuries. |

Table 11.14 ANNUAL GROSS OPERATING SURPLUS AND GROSS MIXED INCOME— Stage 2b: Farm GOS and farm GMI

| Item | Comment |
|---|---|
| **Total farm Gross Operating Surplus (GOS)/Gross Mixed Income (GMI)** | Total farm GOS/GMI is derived as:<br>Gross value added for the agriculture industry (subdivision 01)<br>*less* compensation of employees for the agriculture industry<br>*less* production valuation adjustment<br>*less* other taxes on production for the agriculture industry<br>*plus* other subsidies on production for the agriculture industry. |
| *Gross value added for agriculture industry* | For the benchmark years gross value added is directly sourced from the benchmark estimate. The gross value of agricultural production for the benchmark is estimated from data collected in the ABS annual agricultural commodity survey, published in the ABS publication *Agriculture, Australia (*cat. no. 7113.0), together with additional data from various marketing organisations, wholesalers, brokers and auctioneers.<br><br>The general approach used is:<br><br>1. Derive the market value of farm production by collecting quantity data from farm establishments and marketing organisations, then<br><br>2. Multiply the quantities by prices supplied by marketing boards, marketing reports, wholesalers, brokers and auctioneers.<br><br>For wheat, the current period crop is initially valued at the price expected to be realised on eventual sale.<br><br>For the latest year's output and intermediate use (and therefore gross value added) for agriculture is estimated using data published in the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0) and is supplemented by annual data from Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication.<br><br>Compensation of employees is estimated using supply and use benchmarks for wages and salaries and employer social contributions. |
| *Production valuation adjustment (PVA)* | The PVA is required for wheat and wool because the gross value of production is based on estimated or realised future sales prices, which may be different from the prices prevailing in the market at the time production took place (i.e. the basis required for national accounts).<br><br>The PVA is estimated directly using quantity data and the difference between average current period prices and the prices underlying the calculation of the gross value of production. |
| *Compensation of employees* | Is directly sourced from the benchmark estimate of agriculture compensation of employees. |
| *Other taxes on production* | Are directly sourced from the benchmark estimate of agriculture other |

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| | taxes on production. |
| *Other subsidies on production* | Are directly sourced from the benchmark estimate of agriculture other subsidies on production. |
| **Split of total farm GOS/GMI into farm GOS and farm GMI** | A ratio of unincorporated enterprises to incorporated enterprises for the agriculture industry is derived using data from the Annual Integrated Collection (AIC). This ratio is reviewed from time to time to ensure it remains relevant to current industry conditions.<br><br>This ratio is applied to the total farm GOS/GMI estimate to derive the farm GOS and farm GMI estimates.<br><br>The following calculation is then made:<br>Total private non-financial corporations GOS and GMI<br>*less* total farm GOS and farm GMI<br>*equals* total non-farm private non-financial corporations GOS and non-farm GMI. |

Table 11.15 ANNUAL GROSS OPERATING SURPLUS AND GROSS MIXED INCOME —Stage 2c: Non-farm private non-financial corporations and quasi-corporations GOS and Non-farm GMI

| Item | Comment |
|---|---|
| **Non-farm private non-financial corporations and quasi-corporations GOS from Australian Taxation office (ATO) data** | Annual estimates for non-farm private non-financial corporations and quasi-corporations are derived from Australian Taxation Office (ATO) statistics supplemented by information from the ABS and other sources.<br><br>Estimates for the most recent two years are based on preliminary tax data and various other indicators as there is a time lag in obtaining complete income tax data. At the time of the release of the annual national accounts, the third last year is based on complete tax data, the second last year is based on preliminary tax data and the last year is based on the same sources as those used to prepare the quarterly estimates.<br><br>Net business income for private non-financial corporations (excluding agriculture) is derived from the ATO data as follows:<br><br>Total income<br>*less* total expenses<br>*plus* bad debts<br>*less* dividends received<br>*equals* net business income.<br><br>In order to align the net business income as closely as possible with 2008 SNA guidelines for GOS the following adjustments are made:<br><br>Non-farm private non-financial GOS equals<br><br>Net business income<br>*plus* depreciation<br>*plus* net interest, land rent and rent on natural resource assets paid<br>*plus* a finance lease adjustment<br>*plus* adjustment for understatement of net business income<br>*plus* an adjustment for mineral and petroleum exploration expenditure<br>*plus* intellectual property products (i.e. capitalised computer software, artistic originals, and R&D) adjustment<br>*plus* non-life insurance premiums adjustment<br>*less* non-life insurance service charges<br>*less* FISIM |

*less* Inventory valuation adjustment (IVA).

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| ***Depreciation*** | This adjustment is required because in the net business income data, depreciation has already been deducted as an expense but for national accounting purposes the decline in the value of assets (consumption of fixed capital) is not deducted when deriving GOS. |
| ***Net interest, land rent and rent on natural resource assets*** | Estimates for net interest, land rent and rent on natural resource assets are prepared using a matrix of flows for each of the three components. The matrices represent a fully balanced system of flows between each sector including the unincorporated sector. They are constructed using data from Government Finance Statistics, ABS collections from financial corporations, the Reserve Bank of Australia, the Australian Prudential Regulatory Authority, the ABS Balance of Payments and the Australian Taxation Office.<br><br>This adjustment is applied as net business income has already included net interest, land rent and rent on natural resource assets in its calculation but GOS needs to be valued prior to taking these items into account. |
| ***Finance lease adjustment*** | The finance lease adjustment is required because businesses can choose to write off the whole of the lease payments as a deduction for taxation purposes in the period of payment whereas, for national accounting purposes, lease payments are divided into notional interest and principal components and only the service charge component of the interest payable is deducted in deriving GOS. Estimates of the adjustment have been derived from tax data and ABS statistics on financial corporations' income derived from finance leasing. |
| ***Understatement of net business income*** | Understatement of net business income can arise as a result of businesses understating business receipts or overstating expenses (or both) in their income tax returns, or by not filing a tax return at all. To the extent that such understatement remains undetected by the Australian Taxation Office, without adjustment the basic source data for estimates of GOS will be negatively biased. Consequently, an adjustment is made to the net business income data obtained from tax data for the purpose of compiling estimates of GOS. There is limited direct evidence about the extent of understatement (e.g. by ongoing audits of a random sample of businesses by the Australian Taxation Office). Therefore, the adjustment applied relies on an assessment of diverse information including anecdotal evidence. |
| ***Intellectual property products*** | Expenditure on software which is to be used in the production process for more than one year is treated as part of gross fixed capital formation rather than as intermediate consumption, so an adjustment is made to the intermediate consumption estimate to reflect the correct treatment. A similar adjustment is also applied for expenditure on research and development and for artistic originals which are capitalised. |
| ***Non-life insurance premiums*** | An adjustment is made to add back in the total amount of non-life insurance premiums as a business can expense the whole of their payments for insurance but for national accounting purposes they are not considered as part of intermediate consumption when calculating GOS. |
| ***Insurance service charge*** | A further adjustment is also made to account for the value of the imputed insurance services consumed by incorporated businesses. |
| ***FISIM*** | An adjustment is required to appropriately record the value of imputed financial services consumed by incorporated businesses. |
| ***Inventory valuation adjustment*** | Described in table 10.58 QUARTERLY CHANGES IN INVENTORIES—Inventory Valuation Adjustment (IVA). |

**Non-farm GMI from Australian Taxation Office data**

Annual non-farm GMI for unincorporated enterprises is derived from the Australian Taxation Office statistics supplemented by information from ABS and other sources.

Estimates for the most recent two years are based on preliminary tax data and various other indicators as there is a time lag in obtaining complete income tax data. At the time of the release of the annual national accounts, the third last year is based on complete tax data, the second last year is based on preliminary tax data and the last year is based on the same sources as those used to prepare the quarterly estimates.

Net business income for non-farm GMI is derived from the ATO data as follows:

Total income
*less* total expenses
*equals* net business income.

In order to align the net business income as closely as possible with 2008 SNA guidelines for GMI, the following adjustments are made:

Non-agricultural GMI equals

Net business income
*plus* depreciation
*plus* net interest, land rent and rent on natural resource assets paid
*plus* a finance lease adjustment
*plus* owner-builders' gross mixed income
*plus* net non-dwelling rent received
*plus* adjustment for understatement of net business income
*plus* adjustment for home production of goods
*plus* intellectual property products (i.e. capitalised computer software, artistic originals and R&D) adjustment
*plus* a bad debt adjustment
*plus* non-life insurance premiums adjustment
*less* non-life insurance service charges
*less* FISIM
*less* Inventory valuation adjustment (IVA).

***Depreciation***

This adjustment is required because in the net business income data, depreciation has already been deducted as an expense but for national accounting purposes the decline in the value of assets (consumption of fixed capital) is not deducted when deriving GMI.

***Net interest, land rent and rent on natural resource assets***

Estimates for net interest, land rent and rent on natural resource assets are prepared using a matrix of flows for each of the three components. The matrices represent a fully balanced system of flows between each sector including the unincorporated sector. They are constructed using data from Government Finance Statistics, ABS collections from financial corporations, the Reserve Bank of Australia, the Australian Prudential Regulatory Authority, the ABS Balance of Payments and the Australian Taxation Office.

This adjustment is applied as the net business income has already included net interest, land rent and rent on natural resource assets in its calculation but GMI needs to be valued prior to taking these items into account.

***Finance lease adjustment***

The finance lease adjustment is required because businesses can choose to write off the whole of the lease payments as a deduction for taxation purposes in the period of payment whereas, for national accounting purposes, lease payments are divided into notional interest

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| | and principal components and only the service charge component of the interest payable is deducted in deriving GMI. Estimates of the adjustment have been derived from tax data and ABS statistics on financial corporations' income derived from finance leasing. |
| ***Owner builders' GMI*** | Owner-builders' GMI is derived as a proportion of owner-builders' value of work done, as recorded in the quarterly Building Activity Survey. |
| ***Net non-dwelling rent received*** | Net non-dwelling rent received is based on taxation data adjusted to exclude rent received on tenanted dwellings. This adjustment is made in order to capture all units that receive income from rents or dividends. |
| ***Understatement of net business income*** | Understatement of net business income can arise as a result of businesses understating business receipts or overstating expenses (or both) in their income tax returns, or by not filing a tax return at all. To the extent that such understatement remains undetected by the Australian Taxation Office, without adjustment the basic source data for estimates of GMI will be negatively biased. Consequently, an adjustment is made to the net business income data obtained from tax data for the purpose of compiling estimates of GMI. There is limited direct evidence about the extent of understatement (e.g. by ongoing audits of a random sample of businesses by the Australian Taxation Office). Therefore, the adjustment applied relies on an assessment of diverse information including anecdotal evidence. |
| ***'Backyard' production*** | An allowance is included for the imputed income derived by households who produce some of their own goods. |
| ***Intellectual property products*** | Expenditure on software which is to be used in the production process for more than one year is treated as part of gross fixed capital formation rather than as intermediate consumption so an adjustment is made to the intermediate consumption estimate to reflect the correct treatment. A similar adjustment is also applied for expenditure on research and development and for artistic originals which are capitalised. |
| ***Non-life insurance premiums*** | An adjustment is made to add back in the total amount of non-life insurance premiums as a business can expense the whole of their payments for insurance but for national accounting purposes they are not considered as part of the intermediate consumption when calculating GMI. |
| ***Insurance service charge*** | A further adjustment is also made to account for the value of the imputed insurance services consumed by unincorporated businesses. |
| ***FISIM*** | A similar adjustment is also required to appropriately record the value of imputed financial services consumed by unincorporated businesses. |
| ***Inventory valuation adjustment*** | Described in table 10.58 QUARTERLY CHANGES IN INVENTORIES—Inventory Valuation Adjustment (IVA). |
| **Split non-farm private non-financial corporations (and quasi-corporations) GOS and non-farm GMI** | Australian Taxation Office data are used to derive the ratios of non-farm private non-financial corporations (and quasi-corporations) GOS and non-farm GMI to total non-farm GOS and GMI.<br><br>These ratios are applied to total non-farm private non-financial corporations GOS and non-farm GMI to obtain estimates for both components. |

Table 11.16 ANNUAL GROSS OPERATING SURPLUS AND GROSS MIXED INCOME —Stage 2d: Private non-financial corporations and quasi-corporations GOS and GMI

| Item | Comment |
|---|---|
| **Private non-financial corporations and quasi-corporations GOS** | The sum of farm private non-financial corporations GOS and non-farm private non-financial corporations GOS. |
| **GMI** | The sum of farm GMI and non-farm GMI. |

*Latest year*

11.34 The sources and methods used to estimate GOS for Dwellings owned by persons are the same as for the benchmark years.

11.35 The tables below outline the data sources and methods used in the estimation of GOS and GMI for the latest financial year by institutional sector in current prices only. Volume estimates are not calculated for GOS and GMI.

Table 11.17 ANNUAL GROSS OPERATING SURPLUS—Latest year, except Dwellings owned by persons

| Item | Comment |
|---|---|
| **Private non-financial corporations** | Derived by extrapolating the latest annual net business income from the tax data (year t-1) using the movements in the annual estimates, between year t-1 and t, from the Quarterly Business Indicators Survey profits data less any abnormal items that contribute to business profit (e.g. revaluations, foreign exchange gains/losses, etc.). The estimate for net business income is then adjusted to bring it in line with SNA 2008 guidelines using the same adjustments as described for the benchmark years above. |
| **Public non-financial corporations** | Derived by extrapolating the latest benchmark year (t-1) using an annual indicator obtained from quarterly data from Government Finance Statistics. |
| **Financial corporations** | For the latest year, GOS for financial corporations is compiled using data sources and methodology as described for the annual benchmarks section for (i) financial services and (ii) insurance and pensions funds services. Separate growth rates are derived for the latest year (t) and the unbenchmarked (prior to supply and use balancing) year t-1 GOS estimates for (i) financial services and (ii) insurance and superannuation funds services. The growth rates are applied to the benchmarks for the year t-1 to derive GOS estimates for the latest year for (i) financial services and (ii) insurance and pension superannuation services.<br><br>For auxiliary finance and insurance services GOS, an annual output indicator representing the funds management industry (a significant contributor to the GOS of auxiliary services) is derived. The pension fund investment expense from the GOS calculation of pension funds is used as the indicator. The pension funds predominately use the funds management industry to invest their members funds, and the investment expense would represent the fees charged by the funds management industry. The growth rate for the latest year from the indicator series is applied to the benchmarks for the year t-1 to derive GOS estimates for the latest year for auxiliary finance and insurance services. |

| | |
|---|---|
| | The latest year GOS estimates for (i) financial services, (ii) insurance and pension funds services and (iii) auxiliary finance and insurance services are summed to produce the total GOS for financial corporations. |
| **General Government** | General government GOS is equivalent to the value of consumption of fixed capital on general government assets because, by convention, the value of general government gross output is measured as the cost of producing that output, including consumption of fixed capital.<br><br>GOS is calculated as gross output less the costs incurred in producing that output (but before deducting consumption of fixed capital), leaving consumption of fixed capital as the residual.<br><br>For the latest year annual estimates of consumption of fixed capital at current prices for general government (general government GOS) are derived using a perpetual inventory model. |

Table 11.18 ANNUAL GROSS MIXED INCOME—Latest year

| Item | Comment |
|---|---|
| **Farm** | Total farm gross operating surplus (GOS) and gross mixed income (GMI) for the latest year is derived using a production approach and is measured as gross value of agricultural production less the costs incurred (but before deducting net interest and land rent paid and consumption of fixed capital). The gross value of agricultural production includes an allowance for backyard production of fruit and vegetables and the value of meat produced from livestock raised for household use.<br><br>Gross value of production for agriculture is estimated using data in the ABS publication *Value of Agricultural Commodities Produced, Australia* (cat. no. 7503.0) and is supplemented by annual data from Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication.<br><br>Intermediate inputs use the same data sources as the gross value of production.<br><br>Compensation of employees is estimated using S-U benchmarks for wages and salaries and employer social contributions and extrapolating benchmark estimates for the latest year using data from Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication (Farm Costs and Returns – Labour).<br><br>An estimate of farm GOS for private non-financial corporations and quasi-corporations has to be removed from total farm GOS and GMI to obtain an estimate of gross mixed income of farm unincorporated enterprises. The estimate of farm GOS for private non-financial corporations is derived by applying ratios of unincorporated and incorporated farm enterprises to the total farm GOS and GMI. This ratio was derived from business income data from Australian Taxation Office several years ago. |
| **Non-farm** | Non-farm GMI is derived by extrapolating the latest annual benchmark (year t-1) using the movements of the sum of the quarterly indicator for non-farm GMI which is based on the Quarterly Business Indicator Survey. |
| **Total Gross Mixed Income (GMI)** | The summation of farm GMI and non-farm GMI. |

Sources and methods – Quarterly

11.36 The tables below outline the data sources and methods used in the estimation of quarterly GOS and GMI by institutional sector in current prices only. Note NPISHs are not distinguished as a separate sector as they are included the household sector. Consequently, GOS of NPISHs is implicitly included. Volume estimates are not calculated for GOS and GMI.

Table 11.19 QUARTERLY GROSS OPERATING SURPLUS—Non-financial corporations and quasi-corporations

| Item | Comment |
|---|---|
| **Private non-financial corporations and quasi-corporations** | The annual benchmarks are allocated to quarters using gross operating profits data from the Quarterly Business Indicators Survey.<br><br>For incomplete years the quarterly estimates of private non-financial corporations GOS are calculated by extrapolating the latest quarterly estimates that have been benchmarked to an overall annual level. The movements in the gross operating profits data from the Quarterly Business Indicators Survey are used as the indicator. |
| **Public non-financial corporations and quasi-corporations** | Estimates of public non-financial corporations GOS from quarterly Government Finance Statistics are used as an indicator to extrapolate the latest annual estimate. |

Table 11.20 QUARTERLY GROSS MIXED INCOME—Unincorporated enterprises

| Item | Comment |
|---|---|
| **Gross mixed income** | |
| **Non-farm GMI** | Annual non-farm GMI estimates are allocated to the quarters and extrapolated for quarters in year t-1 (and quarters in the incomplete year) based on a combination of Quarterly Business Indicators Survey gross operating profits data for unincorporated enterprises, average weekly earnings and labour force self-employed data as indicators.<br><br>This provides an estimate for the majority of the unincorporated non-farm businesses but due to the limitations of the Quarterly Business Indicators Survey data when surveying unincorporated enterprises, additional sources are required:<br><br>• Construction - uses the movement in the value of work done from the Building Activity Survey,<br>• Health and Community services - uses the movement in the household final consumption expenditure on medical and dental services. |
| **Farm GMI** | A range of indicators are used to allocate annual estimates of farm GMI to quarters. Estimates for the current years' quarters are derived as a quarterly allocation of forecast annual totals. The allocations are based on estimated patterns of production and costs, and are progressively updated as data become available. As mentioned previously, the annual estimates (including forecasts) largely depend on the Australian Bureau of Agricultural Resources and Sciences data, which are regularly revised to reflect weather and market conditions.<br><br>Annual estimates of the gross value of production for<br>• wheat and barley - allocated to quarters on the basis of receivals data supplied by the respective marketing boards;<br>• other grains and crops - largely allocated according to proportions derived on the basis of the applicable harvesting season; |

- livestock slaughterings - allocated to quarters using estimates of the quantity of meat produced, obtained from the quarterly publication *Livestock Products, Australia* (cat. no. 7215.0); and
- wool production – is split into two categories:
  - Shorn wool – derived using wool receivals data published in the ABS publications *Livestock Products, Australia* (cat. no.7215.0) and *Value of Agricultural Commodities Produced*, *Australia* (cat. no. 7503.0) and data from the Australian Bureau of Agricultural and Resource Economics and Sciences; and
  - Skin wool – derived using quarterly lamb and sheep slaughterings data from the ABS publication *Livestock Products, Australia* (cat. no.7215.0) and the average greasy wool price from Australian Wool Exchange Limited.

Annual estimates of farm production costs are allocated to quarters on the basis of the pattern of usage appropriate for each particular input. Some inputs are particularly seasonal, such as seed, fodder, fertilisers, fuel usage and the wages of seasonal workers.

Other inputs, such as marketing costs, are allocated according to the estimated gross value of production in each quarter or on the basis of linear trend.

Table 11.21 QUARTERLY GROSS OPERATING SURPLUS—Dwellings owned by persons

| Item | Comment |
|---|---|
| **Dwellings owned by persons** | GOS for ownership of dwellings on a quarterly basis is derived as:<br><br>Output at basic prices<br>*less* intermediate consumption<br>*less* other taxes on production<br>*plus* other subsidies on production.<br><br>An estimate of GOS for dwellings owned by sectors other than households is deducted to obtain GOS for dwellings owned by persons. |
| **Output** | The output estimate is equivalent to the estimate of household final consumption expenditure on imputed rentals for housing plus the actual rental on housing. No further adjustments are made.<br><br>The data sources and methods used to compile quarterly estimates of imputed rentals on housing and actual rental on housing are described in table 10.18 QUARTERLY HOUSEHOLD FINAL CONSUMPTION EXPENDITURE—Housing, water, electricity, gas and other fuels. |
| **Intermediate consumption** | Intermediate use related to dwellings owned by persons GOS includes:<br>• repairs and maintenance;<br>• building insurance;<br>• FISIM;<br>• real estate agent commissions charged for the management of rental properties;<br>• loan application fees;<br>• other direct charges by financial corporations; and<br>• miscellaneous expenses. |
| *FISIM* | The imputed financial service charge relating to dwellings owned by persons is included. The concept of (FISIM) and the methods used to estimate it are described in the financial corporations GOS section (see |

| | |
|---|---|
| | table 11.25). |
| *Municipal rates* | Annual estimates for municipal rates are allocated equally across the quarters. |
| *All other intermediate consumption components* | All other intermediate use categories are calculated using a linear trend of the respective annual estimate. |

Table 11.22 QUARTERLY GROSS OPERATING SURPLUS—General government

| Item | Comment |
|---|---|
| **General Government** | GOS of general government is equivalent to the value of consumption of fixed capital on general government assets because, by convention, the value of general government gross output is measured as the cost of producing that output, including consumption of fixed capital. GOS is calculated as gross output less the costs incurred in producing that output (but before deducting consumption of fixed capital), leaving consumption of fixed capital as the residual.<br><br>On a quarterly basis estimates of consumption of fixed capital at current prices for general government (general government GOS) are derived by extrapolation using a linear trend model. |

Table 11.23 QUARTERLY GROSS OPERATING SURPLUS—Financial corporations and quasi-corporations

| Item | Comment |
|---|---|
| **Financial corporations and quasi-corporations** | The quarterly estimates for GOS of financial corporations are derived by producing output indicators series within the sub categories:<br>• financial services;<br>• insurance and pension funds services; and<br>• auxiliary finance and insurance services. |
| **Financial services** | For financial services, the output indicator is quarterly bank total FISIM. The estimates are compiled using bank balance sheet (*ABS National Accounts, Financial Accounts* (cat. no. 5232.0)) and the detailed breakdown for bank loans and deposits (from the Australian Prudential Regulatory Authority's (APRA) *Monthly Bank Statement of Financial Position*); income and expenditure (from the suite of APRA forms - *Quarterly Bank Statement of Financial Performance*) and indicator interest rates (from the Reserve Bank of Australia's *Statistical Bulletin*). The methodology is the same as described for the annual benchmarks for FISIM. |
| **Insurance and pension funds services** | The output indicator is made up of the following:<br>• Life Insurance - the quarterly source data indicator is the operating expenses for total life insurance businesses sourced from the *Quarterly Life Insurance Performance Statistics* published by Australian Prudential Regulatory Authority (APRA). Data for the most recent quarter are not available. As a result, the current quarter source data indicator is derived by using the same movement as in the corresponding quarter of the previous year. The quarterly insurance service charge indicator for Life Insurance is calculated using the quarterly movement of the indicator source data against the previous quarter's insurance service charge indicator for Life Insurance.<br>• Pension funds - there are two quarterly source data indicators used for Pension Funds. Total investment expenses and total operating expenses of pension funds are sourced from the |

*Quarterly Superannuation Performance Statistics* report published by the Australian Prudential Regulatory Authority (APRA). Data for the most recent quarter are not available. As a result, the current quarter source data indicator is derived by using the same movement as in the corresponding quarter of the previous year. The quarterly insurance service charge indicator for pension funds is calculated using the quarterly movement of the indicator source data against the previous quarter's insurance service charge indicator for Pension Funds.

- Non-life insurance - the insurance service charge indicator for non-life insurance is estimated via a linear trend interpolation of the annual estimates.

A weighted (based on the annual insurance service charge estimates) sum of the three components is derived to produce a quarterly indicator of the insurance service charge.

**Auxiliary finance and insurance services**

The quarterly output indicator is the same as the annual output indicator, i.e. pension fund investment expenses. Total investment expenses of pension funds are sourced from the *Quarterly Superannuation Performance Statistics* published by the Australian Prudential Regulatory Authority (APRA). Data for the most recent quarter are not available. As a result, the current quarter source data indicator is derived by using the same movement as in the corresponding quarter of the previous year. The quarterly financial auxiliary output indicator is calculated using the quarterly movement of the indicator source data against the previous quarter's financial auxiliary output indicator.

**Total financial corporations and quasi-corporations GOS**

A weighted (based on the annual GOS estimates for the sub categories) sum of the three output indicators is derived to produce the quarterly total financial corporation GOS indicator series. The quarterly indicator is used to produce the quarterly total financial corporations GOS series by applying a benchmarking process to the annual series of total financial corporations GOS.

## Taxes less subsidies on production and imports

### Concept

11.37 Taxes payable on production and imports are part of primary income receivable by the general government sector (and, where applicable, non-resident governments) and are payable by other sectors and non-residents. All other current taxes are included in secondary income.

11.38 Taxes on production and imports are disaggregated into two components:

1. Taxes on products, which include

   - taxes that are payable on goods and services when they are produced, delivered, sold, transferred or otherwise disposed of by their producers; and
   - taxes and duties on imports payable when goods enter the economic territory or when services are delivered to residents by non-residents.

2. Other taxes on production, which include

   - taxes related to the payroll or workforce numbers excluding compulsory social security contributions paid by employers and any taxes paid by the employees themselves out of their wages or salaries; recurrent taxes on land, buildings or other structures; some business and professional licences where no service is provided by the Government in return; taxes on the use of fixed assets or other activities; stamp duties; taxes on pollution; and taxes on international financial transactions.

11.39 These two components are required to define the relationships between three important income aggregates: total factor income; gross value added at basic prices; and gross domestic product at market prices. Total factor income plus other taxes less subsidies on production equals gross value added at basic prices, while gross value added at basic prices plus taxes less subsidies on products equals gross domestic product at market prices. For individual units and sectors, taxes on products are not recorded with income when output is valued at basic prices. However, the taxes are recorded with income for the economy as a whole to derive GDP at purchasers' prices.

11.40 GST (from 1 July 2000), wholesale sales taxes (prior to 1 July 2000), customs duties and excise taxes are examples of taxes on products. On the other hand, local government rates, stamp duties, land taxes, payroll taxes, motor vehicle registration charges paid by businesses and taxes on pollution are examples of other taxes on production.

11.41 One of the functions of government is to issue a licence or other certificate for which a fee is payable in order for some activity to be undertaken or for the ownership or use of certain goods to be allowed. If the issue of such licences involves little or no work by the government and the licence is being granted automatically on payment of the amount due, then it is likely the licence is simply a mechanism to raise revenue and therefore a tax. However, if the government exercises some proper regulatory function, e.g. checking the competence, or qualifications, or the person concerned, checking the efficient and safe functioning of equipment, or carrying out some other form of control that it would otherwise not be obliged to do, then the payments are treated as purchases of services rather than payment of taxes, unless the payments are clearly out of all proportion to the costs of providing the services.

11.42 Subsidies are unrequited payments that government units (including, if applicable, non-resident government units) make to resident producers or importers on the basis of the levels of their production activities or the quantities or values of the goods or services which they produce, sell or import. Examples include export incentive grants, dairy industry stabilisation payments, the phosphate fertiliser bounty, and the Tasmanian freight equalisation scheme. Subsidies are paid to influence producers' level of output, the prices at which outputs are sold or the remuneration of the producers. Subsidies can be thought of as negative taxes because their impact on producers' incomes is the opposite of taxes on production.

11.43 Subsidies are not payable to households. Current transfers in cash that governments make directly to households as consumers are treated as social assistance benefits (e.g. old age pensions), while expenditures by government on goods and services produced by market producers that are provided directly to households, individually as consumers, without any further processing, constitute final consumption expenditure by general government and also social benefits in kind. Subsidies also do not include grants that

governments make to enterprises in order to finance their capital formation, or to compensate them for damage to their capital assets, such grants being treated as capital transfers.

11.44 Consistent with taxes, subsidies on production are disaggregated into two components:

1. Subsidies on products
2. Other subsidies on production.

11.45 Subsidies on products are usually payable when the goods or services are produced, sold or imported, although they may also be payable in other circumstances, such as when goods are transferred, leased, delivered or used for own consumption or own capital formation. Subsidies on products may be a specific amount of money per unit of a good or service or they may be calculated ad valorem as a specified percentage of the price per unit. Other subsidies on production consist of subsidies other than those on products, including subsidies on the payroll or workforce, and may relate to the total salary bill or the employment of particular types of persons, such as handicapped persons and the long-term unemployed.

## Sources and methods – Annual

### *Benchmark years*

11.46 The table below outlines the data sources and methods used in the estimation of annual taxes and subsidies on production and imports in current prices.

Table 11.24 ANNUAL TAXES LESS SUBSIDIES ON PRODUCTION AND IMPORTS —By type of tax

| Item | Comment |
|---|---|
| **Taxes less subsidies on production and imports** | Data from Government Finance Statistics from the ABS publication *Government Finance Statistics, Australia (*cat. no. 5512.0) is the main source used to compile taxes and subsidies for all levels of government.<br><br>Government Finance Statistics data classified by tax type and purpose are used to compile taxes and subsidies. Each tax type and purpose category are defined as relating to either taxes and subsidies on products or other taxes and subsidies on production. |
| **Taxes and subsidies on products** | Taxes and subsidies on products are allocated to specific products using a number of methods. These include household final consumption expenditure proportions in the case of the Goods and Services Tax (GST)and supply proportions for other taxes on products. Subsidies are allocated according to the product which best fits the specific purpose category. |
| **Other taxes and subsidies on production and imports** | Other taxes and subsidies on production are also allocated to specific industries. Land taxes and rates are allocated using proportions from Economic Activity Survey data, while payroll taxes are allocated on the basis of compensation of employees' proportions. Other taxes and subsidies on production are allocated to industry based on historical input and output proportions. |

### *Latest year*

11.47 Annual estimates of the latest financial year for production taxes and subsidies are derived by summing the four quarterly estimates using data from Government Finance Statistics.

Sources and methods – Quarterly

11.48 The table below outlines the data sources and methods used in the estimation of quarterly taxes and subsidies on production and imports in current prices.

Table 11.25 QUARTERLY TAXES LESS SUBSIDIES ON PRODUCTION AND IMPORTS

| Item | Comment |
|---|---|
| **Taxes less subsidies on production and imports** | Information about Commonwealth and State general government production taxes and subsidies is received from Government Finance Statistics which are obtained from administrative sources such as the Commonwealth Department of Finance and Deregulation quarterly ledger, and State government quarterly statements of receipts and expenditure. Quarterly data for local government rates are collected from a sample of local government authorities.<br><br>For those production taxes and subsidies where an adjustment to a payable basis is made, the accrual figure is estimated by allocating cash receipts and payments (or estimated cash receipts and payments) to quarters according to the proportion of production or activity occurring in each quarter. For example, the Goods and Services Tax (GST) is allocated quarterly on the basis of when goods and services are consumed, so household final consumption expenditure, gross fixed capital formation, lawyer and real estate fees and intermediate consumption by financial corporations are used for this allocation. |

# CHAPTER 12 THE PRODUCTION ACCOUNT

12.1 Production accounts record the expenses incurred in production and the receipts from sales of goods and services. Sales of goods and services (including goods and services produced for own use) are recorded on the credit (or receipts) side of the account (referred to as the "Resources" side of the accounts in the 2008 SNA). On the debit (or payments) side, expenses of production, namely intermediate consumption, compensation of employees, taxes less subsidies on production and imports, gross operating surplus and gross mixed income are recorded (referred to as the "Uses" side of the accounts in the 2008 SNA). The gross domestic product account is, in effect, a consolidation of the trading accounts of individual enterprises.

12.2 The receipts side of the gross domestic product account in the ASNA shows sales of goods and services to final consumers (including exports less imports) and changes in inventories. Because only sales to final consumers are shown, revenue from the sale of intermediate goods and services (i.e. goods and services used up in the production of final output) does not appear. In the process of consolidation of the production accounts of all sectors, intermediate goods and services cancel out as the revenue of one producer is a cost to another. On the payments side the incomes from production are shown, namely compensation of employees, gross operating surplus, gross mixed income and net taxes on production and imports. Where the gross domestic product account has been derived from balanced S-U tables, the sum of the two sides of the account are balanced, otherwise statistical discrepancies are inserted to achieve balance.

12.3 In the ASNA, the GDP accounts are shown as:

**GDP ACCOUNTS**

| **PRODUCTION** | **EXPENDITURES** | **INCOME** |
|---|---|---|
| Gross value added | Final consumption expenditure | Compensation of employees |
| Taxes less subsidies on products | Gross fixed capital formation | Gross operating surplus |
| Statistical discrepancy (P) | *Domestic final demand* | Gross mixed income |
| | Changes in inventories | *Total factor income* |
| | Net acquisitions of valuables | Taxes less subsidies on production and imports |
| | *Gross national expenditure* | Statistical discrepancy (I) |
| | Exports of goods and services less Imports of goods and services | |
| | Statistical discrepancy (E) | |
| **Gross domestic product** | **Gross domestic product** | **Gross domestic product** |

# CHAPTER 13 THE INCOME ACCOUNT

## TYPES OF INCOME ACCOUNTS AND ADDITIONAL COMPONENTS TO COMPILE INCOME ACCOUNTS

### Types of income accounts

13.1 The national income account shows how gross disposable income is used for final consumption expenditure and the consumption of fixed capital (depreciation), with the balance being the nation's net saving. On the sources of income side it shows compensation of employees, gross operating surplus, gross mixed income (from unincorporated enterprises) and taxes less subsidies on production and imports. Net secondary income from non-residents is added to derive gross national disposable income.

13.2 Saving is carried forward into the capital account. Saving must be used to acquire financial or non-financial assets of one kind or another, including cash, the most liquid of financial assets, or to reduce liabilities. When saving is negative, the excess of consumption over disposable income must be financed by disposing of assets or incurring liabilities.

**NATIONAL INCOME ACCOUNT**

| **SOURCES OF INCOME** | **USE OF INCOME** |
|---|---|
| Compensation of employees | Final consumption expenditure |
| Gross operating surplus | Consumption of fixed capital |
| Gross mixed income | Net saving |
| Taxes less subsidies on production and imports | |
| Net primary income from non-residents | |
| *Gross national income* | |
| Net secondary income from non-residents | |
| **Gross disposable income** | **Gross disposable income** |

13.3 The sectoral income accounts are disaggregations of the national income account, and record for each institutional sector its net income arising both from production and from transfers from other sectors, and its uses of income (disbursements). The difference between income and use of income is net saving (the balancing item). Income accounts are also compiled for selected subsectors. As consumption of fixed capital is not calculated for some subsectors, the balancing item in their subsector accounts is equal to net saving plus consumption of fixed capital (i.e. gross saving). This applies to public and private non-financial corporations subsectors.

13.4 The income accounts for corporations (both financial and non-financial), show income arising from gross operating surplus from the Income from GDP account and property income (such as interest, dividends, reinvested earnings on direct foreign investment and investment funds, property income attributed to insurance policy-holders, and rent on natural assets) from other sectors. Total income is used to make various payments (such as interest, dividends, reinvested earnings on direct foreign investment and investment funds, property income attributed to insurance policy-holders, and rent on natural assets) to other sectors. The balance is the saving of the respective sectors and is transferred to their capital accounts.

13.5 The following tables are truncated versions of the non-financial and financial corporations income accounts as presented in the ASNA. The subsectoral accounts for private and public non-financial corporations are consistent with the non-financial corporations account.

**NON-FINANCIAL CORPORATIONS INCOME ACCOUNT**

| SOURCES OF INCOME | USE OF INCOME |
|---|---|
| Primary income receivable | Primary income payable |
| Gross operating surplus | Property income payable |
| Property income receivable | Secondary income payable |
| Secondary income receivable | Current taxes on income, wealth, etc. |
| Non-life insurance claims | Net non-life insurance premiums |
| Other current transfers | Current transfers to non-profit institutions |
| Net secondary income from non-residents | Other current transfers |
| | **Gross disposable income** |
| | Consumption of fixed capital |
| | Net saving |
| **Total gross income** | **Total use of gross income** |

**FINANCIAL CORPORATIONS INCOME ACCOUNT**

| SOURCES OF INCOME | USE OF INCOME |
|---|---|
| Primary income receivable | Primary income payable |
| Gross operating surplus | Property income payable |
| Property income receivable | Secondary income payable |
| Secondary income receivable | Current taxes on income, wealth, etc. |
| Net non-life insurance premiums | Non-life insurance claims |
| Other current transfers | Other current transfers |
| | **Gross disposable income** |
| | Consumption of fixed capital |
| | Net saving |
| **Total gross income** | **Total use of gross income** |

13.6 The income account of the household sector shows compensation of employees, gross mixed income (on account of unincorporated enterprises) and gross operating surplus on dwellings owned by persons, which are all from the Income from GDP account, as well as property income (interest, dividends, reinvested earnings on investment funds, property income attributed to insurance policy-holders and rent on natural assets) from other sectors, social benefits receivable (social insurance benefits – workers' compensation and social assistance benefits) and various other forms of secondary income (such as non-life insurance claims, current transfers to NPIs and other current transfers). On the use of income side are shown final consumption expenditure, consumer debt interest and other property income payable, income taxes and other current taxes payable, other current transfers, consumption of fixed capital (on account of unincorporated enterprises and dwellings owned by persons) and net saving (the balancing item).

13.7 The following table is a truncated version of the household income account as presented in the ASNA.

**HOUSEHOLD INCOME ACCOUNT**

| SOURCES OF INCOME | | USE OF INCOME | |
|---|---|---|---|
| Primary income receivable | | Primary income payable | |
| Gross operating surplus – dwellings owned by persons | | Property income payable | |
| Gross mixed income | | Secondary income payable | |
| Compensation of employees | | Income tax payable | |
| Property income receivable | | Other current taxes on income, wealth, etc. | |
| Secondary income receivable | | Social contributions for workers' compensation | |
| Social benefits receivable | | Net non-life insurance premiums | |
| Non-life insurance claims | | Other current transfers | |
| Current transfers to non-profit institutions | | **Gross disposable income** | |
| Other current transfers | | Final consumption expenditure | |
| | | Consumption of fixed capital | |
| | | Net saving | |
| **Total gross income** | | **Total use of gross income** | |

13.8 The general government income account shows receipts from income taxes, other taxes on income, wealth, etc., taxes on production and imports, property income (interest, dividends and rent on natural assets) and gross operating surplus (which is equal to consumption of fixed capital for the general government sector). On the use of income side are shown final consumption expenditure, property income payable to other sectors, subsidies, social assistance benefits and other current transfers to non-residents and other sectors, consumption of fixed capital and net saving (the balancing item).

13.9 The following table is a truncated version of the general government income account as presented in the ASNA. The subsectoral accounts for the National and State and Local government accounts are consistent with the general government income account.

**GENERAL GOVERNMENT INCOME ACCOUNT**

| SOURCES OF INCOME | | USE OF INCOME | |
|---|---|---|---|
| Primary income receivable | | Primary income payable | |
| Gross operating surplus | | Property income payable | |
| Taxes on production and imports | | Subsidies | |
| Property income receivable | | Secondary income payable | |
| Secondary income receivable | | Social assistance benefits in cash to residents | |
| Current taxes on income, wealth, etc. | | Other current transfers | |
| Other current transfers | | **Gross disposable income** | |
| | | Final consumption expenditure | |
| | | Consumption of fixed capital | |
| | | Net saving | |
| **Total gross income** | | **Total use of gross income** | |

13.10 In the core income accounts, social transfers in kind are shown as part of government final consumption expenditure. However, for some analyses it is useful to show the value of these transfers as part of household, rather than government, final consumption expenditure. To support these analyses supplementary accounts - called adjusted disposable income accounts - are provided for the general government and household sectors. In these accounts, social transfers in kind are shown as a secondary income transfer from the general government sector to the household sector - hence the term adjusted disposable income - with corresponding adjustments to the final consumption expenditures of the two sectors.

13.11 The following tables outline both the general government adjusted disposable income account and the household adjusted disposable income account as presented in the ASNA.

**GENERAL GOVERNMENT ADJUSTED DISPOSABLE INCOME ACCOUNT**

| **SOURCES OF INCOME** | **USE OF INCOME** |
|---|---|
| **Gross disposable income** | |
| Outlays in kind | Actual collective consumption |
| Social assistance benefits in kind | Consumption of fixed capital |
| Transfers of individual non-market goods and services | Net saving |
| **Adjusted disposable income** | **Total saving and use of adjusted disposable income** |

**HOUSEHOLD ADJUSTED DISPOSABLE INCOME ACCOUNT**

| **SOURCES OF INCOME** | **USE OF INCOME** |
|---|---|
| **Gross disposable income** | |
| Social transfers in kind | Actual individual consumption |
| Social assistance benefits in kind | Consumption of fixed capital |
| Transfers of individual non-market goods and services from general government | Net saving |
| **Adjusted disposable income** | **Total saving and use of adjusted disposable income** |

## Additional components to compile income accounts

13.12 Income flows are divided into primary income and secondary income. Primary incomes are incomes that accrue to institutional units as a consequence of their involvement in processes of production or ownership of assets that may be needed for purposes of production. Therefore, primary income consists of the components used to derive production, namely compensation of employees, gross operating surplus, gross mixed income and taxes less subsidies on production and imports, as well as property income which accrues by lending or renting financial or natural resources, including land, to other units for use in production.

13.13 Secondary incomes are incomes that are redistributed between institutional units by means of payments and receipts of current transfers. A current transfer is a transaction in which one institutional unit provides a good or service to another unit without receiving from the latter any good or service directly in return as counterpart and does not oblige one or both parties to acquire, or dispose of, an asset.

13.14 Income redistribution also includes social transfers in kind, i.e. social benefits in kind transferred from the government to households. These are technically accounted for as part of government final consumption expenditure (because they are produced or purchased by government) but for analytical purposes it is useful to combine these with household final consumption expenditure to form a broader aggregate called actual individual consumption. These are represented in the adjusted disposable income accounts and are included for the household and general government sectors only.

13.15 Therefore the additional components required to compile the income account are:

- property income;
- current taxes on income, wealth etc.
- social contributions and social benefits;
- net non-life insurance premiums and non-life insurance claims;
- miscellaneous current transfers; and
- social transfers in kind.

## PROPERTY INCOME

### Introduction

13.16 Property incomes are received by the owners of financial assets and non-produced non-financial assets such as land and subsoil assets. Property income accrues when an assets' owner puts the asset at the disposal of other institutional units. Units with surplus funds lend or provide equity finance to other units and derive property income in the form of interest, dividends, etc. Owners of land and subsoil assets arrange leases or other contracts with other units who pay rent to the owners. Regular payments made by lessees of subsoil assets are sometimes known as royalties but are treated as rents in the national accounts. A distinction is made between rent, which is a form of property income derived from non-produced assets, and rentals payable under operating leases relating to produced assets, including dwellings and other buildings. Under operating leases, rentals are treated as output of the lessor and purchase of a service by the lessee.

13.17 Property income is recorded net of intra-sector receipts and payments (i.e. property income flows within an institutional sector are not recorded because they cancel out on consolidation). While the household sector may be disaggregated into its business (unincorporated trading enterprises) and non-business subsectors, property income flows between these subsectors are considered intra-sector and are netted out. In relation to property income payments by the household sector, a distinction is drawn between consumer debt interest paid by households and interest on loans for business purposes paid by their unincorporated trading enterprises.

13.18 In the ASNA, property income is presented for the following categories: interest, property income attributed to insurance policy-holders, dividends, rent on natural assets and reinvested earnings on direct foreign investment and investment funds.

### Interest

13.19 Interest is receivable by the owners of financial assets such as deposits, loans, and securities other than shares. Interest is the amount that the debtor becomes liable to pay the creditor over a given period of time without reducing the amount of the principal outstanding. However, interest that accrues and is not paid may be added to the principal amount. In the system, the addition of outstanding interest to the principal constitutes a separate financing transaction. Under the accrual basis of recording used in the system, interest which, under the terms of the contract, does not have to be paid until the asset matures, nevertheless must be attributed to the accounting periods over which it accrues. Under a financial lease the lessor is treated as making a loan to the lessee. Interest on such loans is a component of the lease payments, which have to be broken down between interest and repayment of principal.

13.20 Banks and similar financial intermediaries largely finance their operations by charging higher interest rates on their loans than they pay out on deposits. In effect, the interest paid by borrowers, referred to in the 2008 SNA as 'bank interest', can be regarded as comprising two components, a service charge and a 'pure' interest flow. Likewise, the 'bank interest' paid to depositors can be viewed as a 'pure' interest flow from which a service charge has been deducted. The 2008 SNA refers to the pure interest as 'SNA interest'. As these service charges cannot be measured directly, the imputed charges are accordingly referred to as financial intermediation services indirectly measured (FISIM).

13.21 FISIM for a particular category of financial intermediaries is the sum of the imputed service charges for both borrowers and depositors. The service charge on borrowers is calculated as the level of loans outstanding multiplied by the difference between the average interest rate received on loans and a 'pure' interest rate. Similarly, the service charge on depositors is calculated as the level of deposits multiplied by the difference between the 'pure' interest rate and the average interest rate paid on deposits. The reference rate should contain no service element and reflect the risk and maturity structure of deposits and loans, and could be determined as being equal to a particular market rate of interest. The ASNA uses the mid-point between the average interest rate on loans and the average interest rate on deposits (for practical reasons) as the reference rate of interest, and the long-term bond rate for institutions that are not deposit taking institutions.

13.22 FISIM output is estimated for the following financial intermediaries: banks, other depository corporations, central borrowing authorities and securitisers. The interest flows recorded in the sectoral income accounts are after adjusting the actual interest flows by FISIM relating to both borrowers and depositors. Consequently, interest paid by banks (and similar financial intermediaries) and received by depositors is increased by the amount of FISIM payable by depositors, while interest received by banks (and similar

financial intermediaries) and paid by borrowers is reduced by the amount of FISIM payable by borrowers in each institutional sector (e.g. households, general government, non-financial corporations).

13.23 There are two schools of thought on the measurement of income flows on tradeable securities during times of changing interest rates. The debtor approach records the interest accruing at the contractual rate agreed at the time of issue of the security. The creditor approach records the interest accruing at the current market interest rate. Proponents of the debtor approach argue that it records the legal liability of the debtor to the creditor. Proponents of the creditor approach argue that it is consistent with the market valuation principle. The 2008 SNA recommends the debtor approach be applied for recording interest accruing on debt securities. However, the ABS believes that this approach leads to complications as interest rates may change after the date of issue of variable interest rate instruments. Therefore, the ASNA applies the creditor approach as the best reflection of the market reality in terms of valuing the underlying instrument and the interest that accrues over the life of the instrument.

### Property income attributed to insurance policy-holders

13.24 Property income flows also include imputed flows relating to life insurance, pension funds and non-life insurance operations. Three distinct categories of such flows are included in the sectoral income accounts.

1. Imputed interest from life insurance and pension funds to households is recorded as the current income earned by statutory funds on behalf of policy-holders. This income mainly comprises interest (adjusted for FISIM) and dividend income earned by the funds, but it also includes net rental income earned on real property such as office buildings which are owned by the statutory funds (separately constituted long-service leave boards are also included with these funds). In effect, the net increase in policy-holders' equity in the funds (excluding capital gains and losses) is regarded as being transferred from the funds to households and is also recorded as an imputed flow in the sectoral financial accounts from households back to the funds (recorded as Net equity of households in reserves under the category Insurance technical reserves).

2. Premium supplements are recorded as an imputed property income flow from non-life insurance corporations to policy-holders. Premium supplements represent income earned on the technical reserves of non-life insurance corporations, which consist of unearned premiums (most premiums are paid for a full year in advance) and unpaid claims (which arise because of delays in finalising the payment of claims). Premium supplements do not include any income from the investment of insurance corporations' own funds. The interest component of the investment income is net of FISIM.

3. Imputed interest from the general government sector to households is recorded on account of the unfunded superannuation schemes operated by the general government sector.

13.25 In Australia most governments operate, or used to operate, superannuation schemes for their employees that are unfunded or only partly funded. Some general government schemes have one component funded through direct employee contributions, and another (the employer's contributions) which is unfunded. Other general government schemes comprise only an unfunded employer component.

13.26 In the ASNA the increase in the liabilities of a public sector employer due to the current services provided by employees covered by unfunded superannuation schemes must be imputed. Public sector accounting standards specify how such imputations should be calculated.

13.27 The value of these imputed contributions is estimated as the amount which the employer would be required to pay into a separate superannuation fund if the scheme were to be operated as a fully funded scheme. The general government employer does not transfer the imputed contributions into a separate superannuation fund, but instead effectively borrows this amount and should therefore pay property income on the outstanding liability of the unfunded scheme. Consequently, a further imputation is included in the income accounts of general government and households for imputed interest on the accruing liability to pay unfunded superannuation.

13.28 For the purposes of deriving the imputed flows on account of general government unfunded superannuation, a notional superannuation 'fund' is created which is treated as a financial asset of the household sector and a liability of the general government sector. Consistent with the operation of funded schemes, imputations are derived for both the employers' contributions to the notional fund and property income on the notional use of the assets of the fund in each period by general government. Only the imputed employers' contributions are included in compensation of employees, government final consumption expenditure and GDP. However, both components impact on household and general government saving. This approach ensures that government final consumption expenditure and GDP are not

affected by whether general government superannuation schemes are funded or unfunded. The outstanding liability in relation to unfunded superannuation schemes is recorded as a liability in the general government balance sheet and as an asset in the household balance sheet.

### Dividends

13.29 Corporations raise equity capital through the issue of shares, and shareholders become entitled to dividends as a form of property income for having placed funds at the disposal of the corporations. Dividends include all distributions of profits by corporations, whether or not the distributions are called dividends. Issues of bonus shares in lieu of dividends are not included. In the ASNA, dividends are not recorded on a strict accrual basis, with the time of recording dividends being the point at which the share price starts to be quoted on an ex-dividend basis (rather than at a price that includes the dividend). Super dividends occur when the dividends are disproportionally large relative to the recent level of dividends and earnings. They are treated as a financial transaction, specifically the withdrawal of owners' equity from the corporation.

13.30 Dividends payable to general government by public corporations (or quasi-corporations) record that part of the income of public corporations which is paid to general government, whether described by the corporations (or quasi-corporations) as dividends or transfers of profits. Income tax and other forms of taxation are excluded.

### Withdrawals from income of quasi-corporations

13.31 Quasi-corporations are unincorporated enterprises that behave as if they were corporations. Quasi-corporations cannot distribute profits by way of dividends because they are not corporations. Nevertheless, the owner of a quasi-corporation may choose to withdraw some or all of the entrepreneurial income of the quasi-corporation. Such withdrawals are the conceptual equivalent of dividends and are distinguished in order to separate the income of the quasi-corporation from the income of the owner.

13.32 Because quasi-corporations must, by definition, keep a full set of accounts, withdrawals of income should be explicitly identified in the accounts. Such withdrawals must be distinguished from withdrawals of funds realised as a result of the disposal of assets, which constitute capital disposal by the quasi-corporation and withdrawal of equity (a financing transaction) by the owner. Withdrawals financed by liquidating large amounts of accumulated retained earnings are treated in the same manner. Conversely, funds provided by the owner so that the quasi-corporation can acquire assets or reduce liabilities are treated as equity injections - there is no concept of negative withdrawals of income.

### Reinvested earnings

13.33 Reinvested earnings relate to that component of income that is not distributed to equity and or unit holders in direct foreign investment enterprises, and resident and non-resident investment funds in the form of dividends. In effect, retained earnings are treated as if they are distributed and remitted to investors in proportion to their ownership of the equity in the enterprise or fund and then reinvested by them. They are imputed transactions, with offsetting entries being recorded in property income flows in the income account and the 'shares and other equity' items in the financial account.

#### *Reinvested earnings on direct foreign investment*

13.34 A foreign direct investment enterprise is either a branch (including unincorporated joint ventures) of a non-resident enterprise or an enterprise, either corporate or unincorporated, in which at least one foreign investor owns sufficient shares to have an effective voice in the decision making processes of the enterprise. In these cases, an amount of the enterprise's retained earnings, proportional to the ownership of the foreign direct investor, is imputed as a remittance of property income to the foreign direct investor, even though the remittance does not take place in practice. An equal amount (with opposite sign) is shown as reinvestment of retained earnings, a financing transaction. This treatment is adopted because it is considered that direct investors, through their significant influence on the operations of the direct investment enterprise, are able to determine the level of distributed income and therefore the reinvested earnings of the direct investment enterprise.

13.35 Reinvested earnings on direct foreign investment are measured on the basis of the direct investors' equity share in the gross operating surplus, transfer income and other current income of the direct investment enterprise. Gross operating surplus represents income from the normal operations of the enterprise and

does not include holding gains or losses. Earnings of direct investment enterprises are measured after deducting a provision for corporate taxes and consumption of fixed capital.

*Reinvested earnings on resident and non-resident investment funds*

13.36 Investment income attributed to holders of shares or units in investment funds is shown as two separate items. The first of these is the dividends distributed to investment fund shareholders. The second is retained earnings attributed to investment fund shareholders. These earnings are attributed to the investors as an imputed dividend payment and an imputed purchase of additional equity (reinvestment). This treatment adds to the fund's equity and its liabilities to the unit holders and leaves the investment fund with no saving and increases the saving of the investor. This treatment is adopted for investment funds on the grounds that investors are able to withdraw and reinvest their equity in the investment funds.

### Rent on natural assets

13.37 Rent is the income receivable by the owner of a natural resource (the lessor or landlord) for putting the natural resource at the disposal of another institutional unit (a lessee or tenant) for use of the natural resource in production. The resource rent is applicable for rents on land, native standing timber and subsoil resources. Note there is a distinction between rent and the rentals receivable and payable under an operational lease. The latter are treated as sales or purchases of services whereas the former is property income.

13.38 Rent on land is recorded as accruing continuously to the landowner throughout the period of the contract between the landowner and tenant and is equal to the value of the accumulated rent payable over that period of time. The owners of subsoil assets, whether private or government units, grant leases to other institutional units permitting them to extract deposits over a specified period of time in return for the payment of rent. These payments are commonly referred to as royalties.

## Sources and methods – Annual

13.39 Property income estimates are derived by constructing matrices of the flows of property income between the various sectors and subsectors of the economy, including the external sector. The matrices represent a balanced system so that total payments of property income equal total receipts of property income. The interest and dividends matrices are by far the largest, and include each of the broad types of financial institutions as well as the non-financial sectors of the economy. The matrices relating to land rent and rent on other natural assets are compiled at the institutional sector level only.

13.40 The tables below outline the data sources and methods used in the estimation of annual property income by type of property income in current prices.

Table 13.1 ANNUAL PROPERTY INCOME—Interest and dividends

| Item | Comment |
|---|---|
| **Interest and dividends** | Balance sheet, income and expenditure and interest rate information are used to compile interest and dividend flows by financial instruments (deposits, bills of exchange, one-name paper, bonds, loans and equities) and the counterparty sectoral and subsectoral flows for the following 14 sectors and subsectors: rest of the world; the central bank; banks; other depository corporations; central borrowing authorities; non-life insurance corporations; national general government; state and local general government; national public non-financial corporations; life insurance corporations; pension fund; financial intermediaries not elsewhere classified; private non-financial corporations; and households.<br><br>The following outlines the data sources used to estimate the various components of interest and dividends:<br><br><u>Balance sheets:</u><br>• ABS, *Australian National Accounts, Financial Accounts* (cat. |

no. 5232.0);
- Australian and Prudential Regulatory Authority (APRA) *Monthly Bank Statement of Financial Position*- detailed breakdown for bank loans and deposits;
- ABS, *Assets and Liabilities of Australian Securitisers* (cat. no. 5232.0.55.001);
- ABS, *Managed Funds, Australia* (cat. no. 5655.0); and
- ABS, Capital stock estimates from *Australian System of National Accounts* (cat. no. 5204.0)

Income and expenditure:
- Reserve Bank of Australia (RBA): *Annual Report*; *Financial Stability Report* (6 monthly); *Statement of Monetary Policy* (quarterly);
- ABS publications: *Balance of Payments and International Investment Position, Australia* (cat. no. 5302.0)*; Statistics of Financial Institutions* (cat. no. 5661.0) (note: cat. no. 5661.0 has ceased but for completeness it is included as the data in this publication still underpins the estimates)*;*
- ABS Collections - Economic Activity Survey; Quarterly Survey of Financial Information, Government Finance Statistics;
- Suite of APRA forms - *Quarterly Bank Statement of Financial Performance*, *Quarterly Registered Financial Corporations Statement of Financial Performance and Quarterly Superannuation Statement of Financial Performance;*
- APRA publications: *Quarterly Banks, Building Societies, Credit Unions, Life Insurance, Superannuation and General Insurance Performance Statistics*; and
- ATO publication: *Annual Taxation Statistics.*

Interest rates and dividend yields
- RBA *Statistical Bulletin*.

Three data sources are required to compile the flows:

- total interest/dividend payable and receivable;
- interest or dividend yields for relevant financial instruments of various sectors/subsectors; and
- financial assets and liabilities for the sectors and subsectors.

The sectors' and subsectors' total interest and dividend payable and receivable estimates are used to derive interest and dividend matrices of the flows of interest and dividends between the various sectors and subsectors. The matrices represent a balanced system so that total payments of interest and dividends equal total receipts of interest and dividends.

- For each year, five interest matrices are compiled representing interest flow for deposits, bills of exchange, one name paper, bonds and loans. The five matrices are summed into an aggregate matrix and the interest flows from this aggregate matrix are consolidated to the sectors and subsectors published in the ASNA.
- For dividends, a single matrix is constructed and the dividend flows from this matrix are consolidated to sectors and subsectors published in the ASNA.

Wherever possible actual interest or dividends flows are used to construct the interest and dividend matrix. However, because there is insufficient data on flows by instrument and counterparty, indirect estimation methods are used to complete the full matrix. For example, average interest rates (or dividend yields) are applied to sectoral balance sheet information to derive the detailed estimates of flows by instrument

and counterparty. These estimates are either used as a direct estimate of a flow or are used as a basis for splitting the total flows to the detail required. Total flows are either estimated directly from source data or are derived by aggregation.

The interest flows relating to loans and deposits are adjusted to allow for FISIM. Interest flows from borrowers to financial intermediaries are reduced by FISIM, while interest flows from financial intermediaries to depositors are increased by FISIM.

Adjustments are also made to put interest on debt securities onto an accrual basis for all sectors, except the external sector. This is achieved by replacing estimates of nominal interest flows for debt securities for a particular sector by an accrual estimate obtained by applying the current market rate of interest for debt securities to the average balance sheet level of debt securities for that sector. Accrued interest on debt securities for transactions with the external sector are obtained directly from the Balance of Payments and, consequently, do not require any adjustment before they are included in the interest matrix.

Table 13.2 ANNUAL PROPERTY INCOME—Property income attributed to insurance policy-holders

| Item | Comment |
|---|---|
| **Life insurance and pension funds** | Imputed property income attributable to life insurance and pension fund policy-holders is calculated as:<br><br>Gross operating surplus (GOS)<br>*plus* interest receivable<br>*plus* dividends receivable<br>*less* interest payable<br>*less* taxes payable<br>*less* consumption of fixed capital<br>*less* income to shareholders. |
| Gross operating surplus (GOS) | From the annual benchmarks and latest year estimates for GOS for life insurance corporations and pension funds.<br><br>The GOS estimate includes rental income earned on real property such as office buildings which are owned by the life insurance statutory funds and pension funds. |
| Interest and dividends receivable and payable | Estimates are derived from the interest and dividends matrices. Estimates for interest are adjusted for FISIM. FISIM is added to the total interest received (from deposits) and deducted from interest paid (on loans). Pension funds do not pay dividends. |
| Taxes payable | Estimates for taxes payable are obtained from Government Finance Statistics. |
| Consumption of fixed capital | Estimates for consumption of fixed capital are obtained from the Perpetual inventory model (PIM). |
| Income to shareholders | The proportion of shareholders' funds to total assets (from the Life Insurance balance sheet from ABS *Australian National Accounts, Financial Accounts* (cat. no. 5232.0)) is applied to total income to derive an estimate of shareholders' income. Pension funds do not have |

| | |
|---|---|
| | shareholders. |
| **Non-life insurance corporations** | Imputed property income attributable to non-life insurance and pension fund policy-holders is equal to:<br>• Premium supplements.<br><br>Premium supplements are calculated as the proportion of policy-holders funds to total assets of non-life insurance corporations (from the Australian Prudential Regulatory Authority's *Quarterly General Insurance Performance Statistics* and *General Insurance Supplementary Statistical Tables*) which is applied to total income to derive premium supplements. Total non-life insurance investment income is derived from the interest and dividend matrices (the interest share of investment income is net of FISIM). |
| **Unfunded superannuation fund** | Data up to 1997-98 for imputed employer contributions and imputed property income flows are modelled based on estimates of unfunded employee entitlements from the publication *Government Financial Estimates, Australia* (cat. no. 5501.0) and implicit employer contribution rates provided by the Commonwealth Actuary. Both of these sources provide data which are derived from actuarial calculations. The model is applied to annual data. Quarterly estimates for the imputed employer contributions and imputed property income flows are derived using appropriate indicators.<br><br>With the introduction of accrual accounting in the Commonwealth and State general government sectors direct estimates of both the imputed employer contributions to unfunded superannuation and the imputed interest on the outstanding liability are now being compiled by the Commonwealth, State and Territory Treasuries. From 1998–99, these direct estimates are generally used, although some adjustments are required to the estimates for some States to ensure that the estimates for all jurisdictions are on as comparable a basis as possible. |

Table 13.3 ANNUAL PROPERTY INCOME—Reinvested earnings

| Item | Comment |
|---|---|
| **Reinvested earnings on direct foreign investment and non-resident investment funds** | Estimates for reinvested earnings for foreign direct investment and non-resident investment funds are obtained from the quarterly Survey of International Investment.<br><br>The survey provides data on reinvested earnings on direct foreign investment, both payable to non-residents and receivable from non-residents.<br><br>For investment funds, direct data and some modelled estimates are used to estimate amounts payable to non-residents and receivable from non-residents. |
| **Reinvested earnings resident investment funds** | Balance sheet and income and expenditure data are used to compile reinvested earnings for the following resident investment funds, non-financial investment funds (Infrastructure funds, listed and unlisted property trusts), money market financial investment funds (cash common funds and cash management trusts) and non-money market financial investment funds (unlisted mortgage trusts, listed invested companies, wholesale trusts, non-cash common funds and other trusts).<br><br>Reinvested earnings of these funds are allocated to financial corporations, private non-financial corporations and household sectors. |

The following outlines the data sources used to estimate the various components of reinvested earnings:

Balance sheets:

- ABS *Australian National Accounts, Financial Accounts* (cat. no. 5232.0);

Income and expenditure:

- ABS Collections - Quarterly Survey of Financial Information (Money Market Investment Funds, Non-Money Market Investment Funds and Investment Managers);
- Australian Securities Exchange market capitalisation data for listed investment companies; and
- Ad-hoc reports: superannuation actuarial reports and annual reports for listed investment companies.

Reported income and expense data from surveys and annual reports are used to derive reinvested earnings for the domestic investment funds as:

Total Income
*less* expenses
*less* capital gains and losses
*less* dividends.

The reinvested earnings of the domestic investments funds are allocated to domestic reinvested earnings receivable using quarterly sectoral asset holders of the equity issued by the investment funds from *Australian National Accounts, Financial Accounts* (cat. no. 5232.0).

The compilation process for reinvested earnings described above produces quarterly estimates, and the sum of the four quarters is used as the annual estimate.

Table 13.4 ANNUAL PROPERTY INCOME—Rent on natural resources

| Item | Comment |
|---|---|
| **Rent on natural resources** | Rent on natural assets is mainly paid by corporations and unincorporated enterprises, and received by general government, public corporations and persons.<br><br>Major data sources used are the government administrative records used to compile Government Finance Statistics.<br><br>Rent on natural assets received by persons is derived as a residual using the following calculation:<br><br>Rent on natural assets received by general government<br>*plus* rent on natural assets received by public corporations<br>*less* rent on natural assets paid by non-financial corporations<br>*less* rent on natural assets paid by households<br>*equals* rent on natural assets received by households. |

Sources and methods – Quarterly

13.41 On a quarterly basis, property income estimates are compiled for the household sector, the general government sector and external sector only. The external account is compiled using Balance of Payments statistics.

13.42 The tables below outline the data sources and methods used in the estimation of quarterly property income by sector by type of property income in current prices.

Table 13.5 QUARTERLY PROPERTY INCOME—General government

| Item | Comment |
|---|---|
| **General government** | Quarterly estimates of property income received and paid by general government are derived from the Commonwealth Department of Finance and Administration ledgers, State government monthly and quarterly statements of receipts and expenditure, and a quarterly survey of local government authorities.<br><br>These quarterly estimates are used as indicators to produce property income series for general government by applying a benchmarking process to the annual series of annual property income. |

Table 13.6 QUARTERLY PROPERTY INCOME—Households

| Item | Comment |
|---|---|
| **Interest** | Quarterly indicators for household interest series are based on quarterly banks, other depository corporations and securitisers data and banks' FISIM. Banks are the biggest contributor to interest flows and FISIM out of all the financial intermediaries in Australia. Therefore using indicators based on banks' data is considered to produce a good representative estimate for quarterly household interest.<br><br>Quarterly balance sheets, income and expenditure and interest rate information are used to compile interest flows for banks, other depository corporations and securitisers by financial instruments (deposits, bills of exchange, one-name paper, bonds and loans) and by all counterparty sectoral and subsectoral flows, including the household sector.<br><br>The estimates are compiled using bank balance sheet (ABS *Australian National Accounts, Financial Accounts* (cat. no. 5232.0) and monthly Reserve Bank of Australia *Statistical Bulletin*) detailed loans and deposits data (Australian Prudential Regulatory Authority (APRA) forms *Monthly Bank Statement of Financial Position);* income and expenditure (Suite of APRA forms *Quarterly Bank Statement of Financial Performance* and APRA publications *Quarterly Banks, Building Societies and Credit Unions Performance Statistics*) and indicator interest rates (monthly Reserve Bank of Australia *Statistical Bulletin*).<br><br>The methodology is the same as described for the annual interest and dividends estimates. |
| **Quarterly indicator series** | The following quarterly indicators required for household interest estimates are produced in the first instance:<br>• FISIM for:<br>1. household final consumption expenditure on loans;<br>2. household final consumption expenditure on deposits; |

3. intermediate use for dwellings; and
4. intermediate use for unincorporated enterprises.

- Interest receivable by households:
  1. bank interest payable on deposits to persons, unincorporated enterprises and NPISHs; and
  2. other depository corporations interest payable to households.
- Interest payable by households - dwellings:
  1. bank interest receivable from housing;
  2. other depository corporations interest receivable on housing; and
  3. securitisers interest receivable on housing.
- Interest payable by households – consumer debt:
  1. bank interest receivable from personal loans (consumer credit); and
  2. other depository corporations interest receivable from personal loans (consumer credit).
- Interest payable by unincorporated enterprises:
  1. bank interest receivable from unincorporated enterprises; and
  2. other depository corporations interest receivable from unincorporated enterprises.

**Interest receivable by households**

The household interest receivable is calculated as:

Bank interest payable on deposits to persons, unincorporated enterprises and NPISHs
*plus*
other depository corporations interest payable to households
*equals*
interest received by households indicator
*equals*
household interest receivable before adjusting for FISIM *(the interest receivable by households indicator series is used to derive the quarterly household interest receivable before adjusting for FISIM series by applying a benchmarking process to the annual interest receivable by households)*
*plus*
FISIM for household final consumption expenditure on deposits *(the bank FISIM for household final consumption expenditure on deposits indicator series is used to derive the quarterly series by applying a benchmarking process to the annual series for household final consumption expenditure FISIM on deposits)*.

**Interest payable on dwellings by households**

The household interest payable on dwellings is calculated as:

Bank interest receivable from housing
*plus*
other depository corporations interest receivable on housing
*plus*
securitisers interest receivable on housing
*equals*
interest payable on dwellings indicator
*equals*
interest payable on dwellings before adjusting for FISIM *(the interest payable on dwellings indicator series is used to derive the quarterly interest payable on dwellings before adjusting for FISIM series by applying a benchmarking process to the annual interest payable on dwellings series)*
*minus*
FISIM for intermediate use for dwellings *(the bank FISIM for intermediate use for dwellings indicator series is used to derive the*

*quarterly series by applying a benchmarking process to the annual series for dwelling FISIM)*.

**Interest payable on consumer debt by households**

The household interest payable on consumer debt is calculated as;

Bank interest receivable from personal loans (consumer credit)
*plus*
other depository corporations interest receivable on personal loans
*equals*
interest payable on consumer debt
*equals*
interest payable on consumer debt before adjusting for FISIM *(the interest payable on consumer debt indicator series is used to derive the quarterly interest payable on consumer debt before adjusting for FISIM series by applying a benchmarking process to the annual interest payable on consumer debt series)*
*minus*
FISIM for household final consumption expenditure on loans *(the bank FISIM for household final consumption expenditure on loans indicator series is used to derive the quarterly series by applying a benchmarking process to the annual series for household final consumption expenditure FISIM on loans)*.

**Interest payable by unincorporated enterprises**

The unincorporated enterprises interest payable is calculated as:

Bank interest receivable on unincorporated enterprises loans
*plus*
other depository corporations interest receivable on unincorporated enterprises loans
*equals*
interest payable by unincorporated enterprises indicator
*equals*
interest payable by unincorporated enterprises before adjusting for FISIM *(the interest payable by unincorporated enterprises indicator series is used to derive the quarterly interest payable by unincorporated enterprises before adjusting for FISIM series by applying a benchmarking process to the annual interest payable by unincorporated enterprises series)*
*minus*
FISIM for intermediate use for unincorporated enterprises *(the bank FISIM for intermediate use for unincorporated enterprises indicator series is used to derive the quarterly series by applying a benchmarking process to the annual series for intermediate use unincorporated enterprises FISIM on loans)*.

**Dividends**

Quarterly indicators for the household dividends series are based on dividends paid by banks and private non-financial corporations. The majority of the shares owned directly by households in Australia are from these two sectors. Therefore an indicator based on these two sectors' dividends paid data is considered a good representative indicator for quarterly household dividends received.

Quarterly estimates of dividends paid by banks (from APRA *Quarterly Bank Statement of Financial Performance*) and private non-financial corporations (ABS, Quarterly Business Indicator Survey) are weighted and used as an indicator for dividends received by households. The weights are based on the annual dividends received by households. The quarterly estimates are used as an indicator series to produce a quarterly dividends received series by applying a benchmarking process to the annual series of household dividends received.

**Property income attributed to insurance policy-holders**

Quarterly estimates of property income attributed to insurance policy-holders for life insurance corporations, pension funds and non-life

| | |
|---|---|
| | insurance corporations are compiled by applying a linear trend formula to the aggregate of the annual estimates.<br><br>Quarterly estimates for the imputed interest on unfunded superannuation are compiled by applying a linear trend formula to the annual estimates. This series is also used in the general government income account.<br><br>The above two series are summed to produce the quarterly household series for property income attributed to insurance policy-holders. |
| **Reinvested earnings** | The compilation process for reinvested earnings described in the annual section of property income sources and methods, produces quarterly estimates. The household reinvested earnings from investment funds are obtained directly from this model. Households do not earn reinvested earnings on direct foreign investment. |
| **Rent on natural assets** | Quarterly estimates of rent on natural assets are compiled by applying a linear trend formula to the annual household rent estimates. |

## CURRENT TAXES ON INCOME, WEALTH, ETC.

### Introduction

13.43 Taxes are compulsory, unrequited payments, in cash or in kind made by institutional units to general government units. They are transfers as the government provides nothing directly in return to the individual unit paying the tax. There are two components to current taxes on income, wealth etc., namely

1. income taxes; and
2. other current taxes on income, wealth etc.

13.44 These taxes are part of secondary income receivable by the general government sector and are a component of secondary income payable by other sectors.

### Income taxes

13.45 Income tax consists of taxes on the income of households, corporations and non-residents, and taxes on wealth which are levied regularly (wealth taxes which are levied irregularly are classified as capital taxes and are recorded in the sectoral capital accounts).

13.46 Income tax payable by both non-financial corporations and financial corporations is recorded on an accrual basis. Their income tax payable is directly related to the financial year in which the income that gave rise to the tax liability was earned. Income taxes payable by corporations include taxes on profits, the resources rent tax and income tax on the earnings of superannuation funds.

13.47 While it could be argued that income tax payable by the household sector should be recorded on a similar basis, no accrual adjustments are currently made to the estimates for income tax paid by households which are recorded in Government Finance Statistics. This treatment was adopted on the basis that it is the actual payments by households which affect household spending decisions and disposable income in the current period.

13.48 The Medicare levy is treated as an integral part of income tax payable by the household sector.

13.49 Capital gains taxes payable by households or corporations are recorded in the period in which they become payable, irrespective of the periods over which the gains have been accrued. Capital gains taxes are included as part of income taxes in the sectoral income accounts.

13.50 Income taxes payable by non-residents comprise withholding taxes levied on their Australian income (dividends, interest etc.). Inheritance and gift taxes are excluded because they are classified as capital transfers.

### Other current taxes on income, wealth etc.

13.51 Other current taxes on income, wealth etc. consist mainly of payments by households to obtain licences to own or use vehicles, boats or aircraft, and for licences to hunt, shoot or fish. Other current taxes on income, wealth, etc. relates only to the household sector. If similar taxes are paid by business enterprises they are treated as taxes on production.

13.52 Payments for all other kinds of licences, such as driving or pilot's licences, television or radio licences, firearms licences, and fees paid to government (payments for passports, airport fees, court fees etc.) are treated as purchases of services rendered by general government to households. Such payments are included in household final consumption expenditure and are deducted from total general government current expenditure when deriving estimates for government final consumption expenditure from government output.

### Sources and methods – Annual

13.53 The tables below outline the data sources and methods used in the estimation of annual current taxes on income, wealth, etc. by type of tax and subsequently by institutional sector in current prices.

Table 13.7 ANNUAL CURRENT TAXES ON INCOME, WEALTH, ETC—Income tax

| Item | Comment |
|---|---|
| **Individuals** | |
| **Description** | Income tax for individuals includes income tax, fringe benefits tax (FBT) and tax payable on superannuation contributions. |
| **Household sector** | There are three components to estimating annual current taxes on income, wealth, etc. for the household sector:<br>• Income tax is derived using data from Government Finance Statistics (GFS). Estimates from Government Finance Statistics on a quarterly basis are summed to form the annual estimate. These estimates include the Medicare levy and capital gains tax as well as taxes paid by pay-as-you-go (PAYG) (for employees and self-employed) and pay-as-you-earn (PAYE) net of refunds. The GFS data are collected from administrative data provided by the Department of Finance and Deregulation.<br>• Fringe benefits tax (FBT) is calculated on an annual basis using estimates obtained from the Australian Taxation Office (ATO) (up to year t-1) and final budget outcomes (years t and t+1). Due to the FBT being calculated based on a financial year from 1 April to 31 March, the published series uses three quarters of one year and one quarter of the next year to make it comparable and so the data are needed up until year t+1.<br>• Tax payable on superannuation contributions is calculated by multiplying the average effective tax rate payable by superannuation funds by the total value of assessable contributions. These estimates are obtained from the ATO for all years except year t and t-1. For year t-1 the estimate is derived by extrapolating the estimate for year t-2 using data on total contributions into super funds obtained from the Australian Prudential Regulatory Authority as an indicator. For year t, the annual estimate is the sum of the four quarters for |

the current year.

These are summed to obtain total income tax for the household sector.

**Resident corporations**

**Description**

Income tax for resident corporations includes income tax, resources rent tax, tax paid on capital gains and tax on income earned by superannuation funds.

**Total resident corporations**

The following outlines the sources and methods used to estimate the various types of income tax. These three taxes are summed in order to estimate total income tax paid by resident corporations.

- Income taxes – are derived directly using actual data from the Australian Taxation Office (ATO) for all years except the current year t and year t-1. The estimate for year t-1 is derived using the data from the Commonwealth's consolidated financial statement. The current year is derived by moving forward the year t-1 estimate using the movement in the forecast value in the Commonwealth Final Budget Outcome (CFBO).

- Resource rent tax – is derived using data directly available from the ATO for all years except the current year. The current year is derived by using the movement in the forecast value in the CFBO.

- Estimates for tax on income earned by superannuation funds are obtained as a residual after tax payable on superannuation contributions and tax paid on capital gains by superannuation funds are deducted from the total tax payable by superannuation funds. These data are available for all years from the ATO except for the current year t and year t-1. The estimates for year t-1 and current year are derived using data from Government Finance Statistics. Tax on contributions is obtained using the method described above. This amount is deducted from the estimate of total tax on superannuation obtained from administrative data provided by the Department of Finance and Deregulation. The residual is tax paid on income earned and tax on capital gains earned by superannuation funds. These are not published separately in the ASNA.

**Financial corporations**

Income tax for financial corporations is obtained by using income tax payable by the finance and insurance services industry available from data provided by the ATO for all years except the current year t and year t-1. Estimates for these years are obtained by using movements in income tax payable by total resident corporations as an indicator to move forward this estimate. These amounts are then added to the annual estimate for tax on income and capital gains payable by superannuation funds. This total forms the estimate for financial corporations.

**Public non-financial corporations**

Income tax for public non-financial corporations is obtained from Government Finance Statistics using administrative data obtained from the Department of Finance and Deregulation.

**Private non-financial corporations**

Income tax for private non-financial corporations is derived by deducting income tax payable by financial corporations and public non-financial corporations from income tax payable for total resident corporations.

**Non-resident corporations**

Income tax payable by non-resident corporations is obtained using survey and administrative data from Balance of Payments statistics. This

series includes withholding taxes on dividends and interest.

Table 13.8 ANNUAL CURRENT TAXES ON INCOME, WEALTH, ETC—Other current taxes on income, wealth, etc.

| Item | Comment |
|---|---|
| **Description** | Other current taxes on income, wealth, etc. includes mainly payments by households to obtain licences to own or use vehicles, boats or aircraft, and for licences to hunt, shoot or fish. Other current taxes on income, wealth, etc. relates only to the household sector. If similar taxes are paid by business enterprises they are treated as taxes on production. |
| **Household sector** | Estimates for the household sector are obtained from Government Finance Statistics which are based on administrative data provided by the State Treasuries. Relevant taxes need to be allocated to households as consumers and business enterprises. The part payable by business enterprises is treated as taxes on production and the part payable by households as consumers is recorded as other current taxes on income, wealth, etc. |

## Sources and methods – Quarterly

13.54 The tables below outline the data sources and methods used in the estimation of quarterly current taxes on income, wealth, etc. by type of tax and subsequently by institutional sector in current prices.

Table 13.9 QUARTERLY CURRENT TAXES ON INCOME, WEALTH, ETC—Income tax

| Item | Comment |
|---|---|
| **Individuals** | |
| **Description** | Income tax for individuals includes income tax, fringe benefits tax (FBT) and tax payable on superannuation contributions. |
| **Household sector** | There are two components to estimating quarterly income tax for the household sector:<br>• Income tax– are obtained directly from Government Finance Statistics data.<br>• Fringe Benefits Tax – are obtained directly from Government Finance Statistics data.<br>• Tax payable on superannuation contributions – is calculated by extrapolating the latest annual estimate using the quarterly movement in total wages and salaries.<br>These are summed to obtain total quarterly income tax for the household sector. |
| **Resident corporations** | |
| **Description** | Income tax for resident corporations includes income tax, resources rent tax, tax paid on capital gains and tax on income earned by superannuation funds. |

| | |
|---|---|
| **Total resident corporations** | Income taxes for total resident corporations are derived by extrapolating the latest annual estimate of income tax payable by total resident corporations using the movement in the gross operating profits from the Quarterly Business Indicators Survey. |
| **Non-resident corporations** | Income taxes for non-resident corporations are obtained using data from Balance of Payments statistics. This series includes withholding taxes on dividends and interest. |

Table 13.10 QUARTERLY CURRENT TAXES ON INCOME, WEALTH, ETC—Other current taxes on income, wealth, etc.

| Item | Comment |
|---|---|
| **Description** | Other current taxes on income, wealth, etc. includes mainly payments by households to obtain licences to own or use vehicles, boats or aircraft, and for licences to hunt, shoot or fish. Other current taxes on income, wealth, etc. relates only to the household sector. If similar taxes are paid by business enterprises they are treated as taxes on production. |
| **Household sector** | Data on other current taxes on income, wealth, etc. are obtained from Government Finance Statistics which are based on administrative data provided by the State Treasuries. Relevant taxes need to be allocated to households as consumers and business enterprises. The part payable by business enterprises is treated as taxes on production and the part payable by households as consumers is recorded as other current taxes on income, wealth, etc. |

## SOCIAL CONTRIBUTIONS AND SOCIAL BENEFITS

### Introduction

13.55 Social benefits are current transfers receivable by households to provide for needs that arise from certain events or circumstances such as sickness, unemployment, retirement, housing, education or family circumstances. There are two kinds of social benefits included in ASNA, namely

1. social insurance benefits (in the ASNA, only workers' compensation is recorded here), and
2. social assistance benefits.

13.56 The former are provided by social insurance schemes operated by financial institutions or by employers on behalf of their employees. Social insurance schemes pay benefits from accumulated social contributions, which are paid into the schemes by employers on behalf of employees, or directly by the employees. Social assistance benefits are paid by governments from general revenue and are not paid from social contributions. Social insurance benefits and social assistance benefits are part of the gross secondary income of households.

### Social insurance benefits - workers' compensation

13.57 The only relevant social insurance scheme in the Australian context relates to workers' compensation. Households make social contributions for workers' compensation and receive social benefits from claiming for workers' compensation. Households are regarded as receiving workers' compensation premiums as part of the employer social contributions component of compensation of employees, making social contributions for workers' compensation and consequently receiving social benefits from workers' compensation. All of these flows related to workers' compensation are recorded in the household income account. The workers' compensation premiums which are included in employers' social contributions include direct workers'

compensation premiums payable and the direct cost of workers' compensation to employers who are permitted to self-insure.

### Social assistance benefits

13.58 Social assistance benefits are paid by general government from general revenue and are not financed from social contributions. Social assistance benefits (in cash to residents) include old age pensions, family and child benefits, sickness and unemployment benefits, benefits to ex-service persons and their dependants, and government scholarships.

## Sources and methods – Annual

13.59 The tables below outline the data sources and methods used in the estimation of annual social contributions and social assistance in current prices.

Table 13.11 ANNUAL SOCIAL CONTRIBUTIONS AND SOCIAL BENEFITS—Social insurance benefits – workers' compensation and social benefits receivable – workers' compensation

| Item | Comment |
|---|---|
| **Social insurance contributions – workers' compensation** | Social insurance contributions for workers compensation net premiums is calculated as:<br>Workers' compensation premiums<br>*plus* Workers' compensation premium supplements<br>*less* Workers' compensation insurance service charge (ISC).<br><br>*where ISC = premiums +premium supplements - expected claims,*<br><br>It follows that Social contributions for workers' compensation net premiums equals Workers' compensation expected claims.<br><br>(See Table 13.15 ANNUAL NET NON-LIFE INSURANCE PREMIUMS AND NON-LIFE INSURANCE CLAIMS for methodology and data sources.) |
| **Social benefits receivable– workers' compensation** | Social benefits receivable – workers' compensation is equal to actual claims.<br><br>The compilation methodology for sectoral ISC requires sectoral actual claims estimates.<br><br>(See Table 13.15 ANNUAL NET NON-LIFE INSURANCE PREMIUMS AND NON-LIFE INSURANCE CLAIMS for methodology and data sources.) |

Table 13.12 ANNUAL SOCIAL CONTRIBUTIONS AND SOCIAL BENEFITS—Social assistance benefits

| Item | Comment |
|---|---|
| **Social assistance benefits** | Social assistance benefits are obtained directly from Government Finance Statistics which are compiled using information from administrative sources such as the Commonwealth Department of Finance and Deregulation and State government annual statements of receipts and expenditure. |

### Sources and methods – Quarterly

13.60 The table below outlines the data sources and methods used in the estimation of quarterly social contributions and social assistance in current prices.

Table 13.13 QUARTERLY SOCIAL CONTRIBUTIONS AND SOCIAL BENEFITS—Social insurance benefits – workers' compensation

| Item | Comment |
|---|---|
| **Social insurance benefits – workers' compensation** | Quarterly estimates of social contributions for workers' compensation and social benefits from workers' compensation are compiled by trending annual estimates for the private and public sectors. |

Table 13.14 QUARTERLY SOCIAL CONTRIBUTIONS AND SOCIAL BENEFITS—Social assistance benefits

| Item | Comment |
|---|---|
| **Social assistance benefits** | Quarterly estimates of social assistance benefits are compiled using Government Finance Statistics which are obtained from administrative sources such as the Commonwealth Department of Finance and Deregulation and State Government financial statements. |

## NET NON-LIFE INSURANCE PREMIUMS AND NON-LIFE INSURANCE CLAIMS

### Introduction

13.61 The premiums charged by non-life insurance corporations can be regarded as comprising two components:

1. an implicit service charge, and
2. a transfer payment to cover the risk of providing insurance cover.

13.62 The non-life insurance service charge is defined as premiums earned plus premium supplements less expected claims. Premium supplements represent income earned on the technical reserves of non-life insurance corporations, which consist of unearned premiums (most premiums are paid for a full year in advance) and unpaid claims (which arise because of delays in finalising the payment of claims). Premium supplements do not include any income from the investment of insurance corporations' own funds. The interest share of investment income is net of FISIM. Expected claims are generally defined as a centred five year moving average of claims incurred. To estimate expected claims it is necessary to forecast claims incurred for year t+1 and year t+2. A moving average is used to avoid irregular movements in the non-life insurance service charge which would otherwise arise because of volatility in the annual data for claims incurred.

13.63 Net non-life insurance premiums are defined as non-life insurance premiums and premium supplements less the non-life insurance service charge. This flow is regarded as a transfer payment from institutional sectors which use the services provided by non-life insurance corporations and is recorded as a use of income in the sectoral income accounts and a receipt of income for non-life insurance corporations in the financial corporations income account. Non-life insurance claims are the claims incurred in the current accounting period and are recorded in the sectoral income accounts as transfers from non-life insurance corporations to other institutional sectors.

13.64 Health insurance funds are treated as part of the non-life insurance subsector, and consequently net health insurance premiums and claims are included, respectively, as part of net non-life insurance premiums and

non-life insurance claims. Workers' compensation schemes may be conducted either by specialist financial corporations whose only business is workers' compensation, or by non-life insurance corporations that provide non-life insurance for various classes of business. The operating surplus generated by workers' compensation business is included in the gross operating surplus for the financial corporations sector. However, workers' compensation premiums and claims are excluded from the transfer flows for net non-life insurance premiums and non-life insurance claims because they are shown separately as a component of social benefits and social contributions.

## Sources and methods – Annual

13.65 The tables below outline the data sources and methods used in the estimation of annual net non-life insurance premiums and non-life insurance claims in current prices.

Table 13.15 ANNUAL NET NON-LIFE INSURANCE PREMIUMS AND NON-LIFE INSURANCE CLAIMS

| Item | Comment |
|---|---|
| **Data sources** | Annual estimates for net premiums and claims for non-life insurance are compiled using data published by:<br>• Australian Prudential Regulatory Authority (APRA) in the *General Insurance Performance Statistics; General Insurance Supplementary Statistical Tables; Half Yearly General Insurance Bulletin* and *Selected Statistics on the General Insurance;*<br>• Private Health Insurance Administration Council publication *Operations of the Registered Health Benefits Organisations*; and<br>• ABS, *Balance of Payments and International Investment Position, Australia,* (cat. no. 5302.0). |
| **Net non-life insurance premiums** | Net non-life insurance premiums is calculated as<br>Premiums<br>*plus* premium supplements<br>*less* insurance service charge (ISC)<br><br>*where ISC = premiums + premium supplements - expected claims,*<br><br>It follows that Net non-life insurance premiums = Expected claims<br><br>The derivation of the annual total insurance service charge for non-life insurance (see Table 9.22 ANNUAL GROSS VALUE ADDED BY INDUSTRY-Insurance and superannuation funds, subdivision 63), is compiled at the elemental insurance business class level, i.e. ISC is calculated for types of insurance products such as workers' compensation. The compilation of total ISC output enables the allocation of ISC by final use (household final consumption expenditure) and intermediate consumption directly. Intermediate consumption of ISC is classified by:<br><br>• non-financial corporations (private and public)<br>• financial corporations<br>• general government<br>• unincorporated enterprises<br>• ownership of dwellings. |
| **Non-life insurance claims** | Non-life insurance claims are equal to actual claims.<br><br>The compilation methodology for sectoral ISC requires sectoral actual claims estimates. |

### Sources and methods – Quarterly

13.66 The tables below outline the data sources and methods used in the estimation of quarterly net non-life insurance premiums and non-life insurance claims in current prices.

Table 13.16 QUARTERLY NET NON-LIFE INSURANCE PREMIUMS AND NON-LIFE INSURANCE CLAIMS

| Item | Comment |
|---|---|
| | Quarterly sectoral estimates of net non-life insurance premiums and non-life insurance claims are compiled by applying a linear trend formula to the annual estimates. |

## MISCELLANEOUS CURRENT TRANSFERS

### Introduction

13.67 There are a number of miscellaneous current transfers recorded in the ASNA. The following categories of transfers are identified and recorded separately:

1. Current transfers to non-profit institutions serving households (NPISHs);
2. Current transfers from the Commonwealth government to State and local government;
3. Current international cooperation; and
4. Other current transfers.

### Current transfers to non-profit institutions serving households

13.68 Current transfers to non-profit institutions serving households consist of transfers received by NPISHs from other resident or non-resident institutional units in the form of membership dues, subscriptions, voluntary donations, etc. whether made on a regular or occasional basis. They are made principally to institutions such as hospitals, private schools, and religious and charitable organisations. They are treated in the national accounts as current transfers rather than as government final consumption expenditure.

13.69 Some current transfers are also made by public non-financial corporations (e.g. Totalisator Agency Boards), generally to organisations such as racing clubs and charities. Transfers from corporations to non-profit institutions serving households that cannot be regarded as payments for advertising or other services would also be included in this item.

13.70 Membership dues or subscriptions paid to market non-profit institutions (NPIs) serving businesses are not current transfers but payments for services rendered and are not included in this item.

### Current transfers from the Commonwealth government to State and local government

13.71 Current transfers from the Commonwealth government to State and local government include the following:

- financial assistance grants to the States and Territories;
- grants to fund State and Territory health care services, education services, social security and welfare services, and similar specific grants for current purposes;
- special revenue assistance grants provided to certain States and Territories;

- financial assistance grants for local governments which are provided through the State and Northern Territory governments; and
- grants for current purposes made directly to local government bodies.

13.72 These transfers appear only in the subsectoral income accounts for National, and for State and Local general government. They do not include transfers of funds committed to finance gross fixed capital formation because such transfers are treated as capital transfers.

### Current international cooperation

13.73 Current international cooperation relates to transfers by the Commonwealth general government sector to non-residents, and includes current transfers to and payments made on behalf of Papua New Guinea, and current transfers under other bilateral aid projects including food aid and disaster relief. The item includes contributions to the United Nations and other international organisations made by virtue of Australia's membership of these organisations, and contributions towards the cost of peacekeeping and emergency forces.

### Other current transfers

13.74 The 2008 SNA states that other current transfers between households are current transfers made, or received, by resident households to or from other resident or non-resident households. However the ASNA does not record transfers between resident households. Other current transfers between households include all cash transfers, the value of in kind transfers and regular remittances between members of the same family resident in different parts of the same country or in different countries, usually from a member of a family working in a foreign country for a period of a year or longer. Earnings remitted by seasonal workers to their families are not international transfers as the workers remain resident in their country of origin (that is, they are still members of their original households) when they work abroad for periods of less than a year. Their earnings are recorded as compensation of employees from abroad if they have the status of an employee in the non-resident country while they are working there or as the provision of services otherwise.

13.75 Other current transfers to non-residents include social assistance benefits payable to non-residents by the Commonwealth government, personal transfers and payments made overseas by residents in respect of gifts, donations, legacies, sustenance, etc. Other current transfers from non-residents consist of receipts by households of social security benefits paid by foreign governments through the Commonwealth government to residents, and gifts, donations, legacies, other pensions etc. When households change their economy of residence, there are changes to the status for the assets they own and liabilities they owe. These changes are recorded as reclassifications through the other changes in volume of assets account.

13.76 Fines are included as other current transfers payable to general government from other institutional sectors in the sectoral income accounts. Fines are civil and criminal penalties imposed on law breakers, other than penalties imposed by taxation authorities (which are regarded as taxes).

13.77 Other current transfers between domestic institutional sectors include amounts transferred as compensation for injury to persons and damage to property arising from the actions of the donor sector or from natural disasters (excluding payments of non-life insurance claims). Both damages awarded by law courts and out of court settlements would be included here, although no such estimates are currently available.

Sources and methods – Annual

13.78 The tables below outline the data sources and methods used in the estimation of annual miscellaneous current transfers in current prices.

Table 13.17 ANNUAL MISCELLANEOUS CURRENT TRANSFERS—Current transfers to NPISH

| Item | Comment |
|---|---|
| **Current transfers to NPISH** | Current transfers to NPISHs are obtained from the compilation of Government Finance Statistics.<br><br>For Commonwealth and State government, data are extracted from administrative sources such as Commonwealth and State Budget Papers and Auditors' General Reports, Commonwealth Department of Finance and Deregulation ledgers and supplementary departmental documents.<br><br>For local government, a joint ABS/Commonwealth Grants Commission annual return is collected from each local government authority and this provides the detail required for this level.<br><br>For Commonwealth public non-financial corporations and quasi-corporations, annual financial statements data are obtained from the Commonwealth Department of Finance and Deregulation. For State based public non-financial corporations, annual financial statements are obtained from State Treasuries.<br><br>The Government Finance Statistics data for current transfers to NPISH from Commonwealth and State Government and public non-financial corporations are used in the ASNA. |

Table 13.18 ANNUAL MISCELLANEOUS CURRENT TRANSFERS—Current transfers from Commonwealth government to State and Local government

| Item | Comment |
|---|---|
| **Current transfers from Commonwealth government to State and Local government** | Current transfers from Commonwealth government to State and Local government are obtained from the Government Finance Statistics.<br><br>For Commonwealth and State government, data are extracted from administrative sources such as Commonwealth and State Budget Papers and Auditors' General Reports, Commonwealth Department of Finance and Deregulation ledgers and supplementary departmental documents.<br><br>The Government Finance Statistics data for current transfers to State and local government from the Commonwealth is used in the ASNA. |

Table 13.19 ANNUAL MISCELLANEOUS CURRENT TRANSFERS —Current international cooperation

| Item | Comment |
|---|---|
| **Current international cooperation** | Estimates of current international cooperation are obtained from the Government Finance Statistics. Data are sourced from the Commonwealth Department of Finance and Deregulation ledgers. |

Table 13.20 ANNUAL MISCELLANEOUS CURRENT TRANSFERS —Other current transfers

| Item | Comment |
|---|---|
| **Other current transfers to and from non-residents** | Other current transfers to and from non-residents are obtained directly from Balance of Payments data.<br><br>The following outlines the data that is used for various components:<br><br>• Commonwealth Budget Papers provide data on Commonwealth government veterans' and social security pensions paid to former Australian residents now living abroad.<br><br>• Other private sector transfers to non-residents are also estimated using data from the Balance of Payments.<br><br>• The Department of Veterans' Affairs provides information about pensions paid to former New Zealand residents now living in Australia (part of other current transfers from non-residents).<br><br>More detailed information on the sources and methods used to compile these estimates is included in *Balance of Payments and International Investment Position, Australia: Concepts, Sources and Methods* (cat. no. 5331.0). |
| **Other current transfers between resident sectors** | Estimates of other current transfers between resident sectors are obtained from the Government Finance Statistics. Data are sourced from administrative sources such as Commonwealth and State Budget Papers and Auditors' General Reports, Commonwealth Department of Finance and Deregulation ledgers and supplementary departmental documents. |

## Sources and methods – Quarterly

13.79 The tables below outline the data sources and methods used in the estimation of quarterly miscellaneous current transfers in current prices.

Table 13.21 QUARTERLY MISCELLANEOUS CURRENT TRANSFERS—Current transfers to NPISH

| Item | Comment |
|---|---|
| **Current transfers to NPISH** | Quarterly current transfers to NPISHs are compiled using information from administrative sources such as the Commonwealth Department of Finance and Administration Quarterly ledger, and State government monthly and quarterly statements of receipts and expenditure. |

Table 13.22 QUARTERLY MISCELLANEOUS CURRENT TRANSFERS—Current transfers from Commonwealth government to State and local government

| Item | Comment |
|---|---|
| **Current transfers from Commonwealth government to State and Local government** | Quarterly current transfers from Commonwealth government to State and local government are compiled using information from administrative sources such as the Commonwealth Department of Finance and Administration Quarterly ledger, and State government monthly and quarterly statements of receipts and expenditure. |

Table 13.23 QUARTERLY MISCELLANEOUS CURRENT TRANSFERS —Current international cooperation

| Item | Comment |
|---|---|
| **Current international cooperation** | Quarterly estimates of current international cooperation are obtained from Commonwealth Department of Finance and Deregulation quarterly ledgers. |

Table 13.24 QUARTERLY MISCELLANEOUS CURRENT TRANSFERS —Other current transfers

| Item | Comment |
|---|---|
| **Other current transfers to and from non-residents** | Current transfers to and from non-residents are obtained directly from Balance of Payments statistics. |
| **Other current transfers between resident sectors** | Quarterly estimates of other current transfers between resident sectors are obtained from the Government Finance Statistics. Data are sourced from administrative sources such as Commonwealth and State Budget Papers and Auditors' General Reports, Commonwealth Department of Finance and Deregulation quarterly ledgers and supplementary departmental documents. |

## SOCIAL TRANSFERS IN KIND

### Introduction

13.80 Social transfers in kind are individual goods and services provided to individual households by general government units and non-profit institutions. The goods and services may be produced by the government units and non-profit institutions or purchased by them. Also included are reimbursements made to individual households by general government units or non-profit institutions for purchases by the households under a scheme that authorises purchase of approved goods and services (e.g. reimbursement of the costs of pharmaceuticals purchased under the Pharmaceutical Benefits Scheme and Medicare rebates for medical services).

13.81 In the ASNA, NPISHs are combined with households as part of the household sector so only the transfers between the household and general government are recorded. If NPISHs were classified to a separate institutional sector, estimates of actual individual consumption and actual collective consumption would be required. The actual individual consumption would be recorded as social transfers in kind to households.

13.82 In the core set of national accounts, social transfers in kind are treated as government final consumption expenditure and not household final consumption expenditure, even though it is the households that directly benefit. Therefore they are not included in household disposable income.

13.83 For some analytical purposes it is useful to consider a measure of household consumption that includes the goods and services provided as social transfers in kind. Consequently, social transfers in kind are included in adjusted disposable income and actual individual consumption. They are recorded in two supplementary accounts, the general government adjusted disposable income account and the household adjusted disposable income account.

13.84 These estimates are compiled annually only.

### Sources and methods – Annual

13.85 The table below outlines the data sources and methods used in the estimation of annual social transfers in kind in current prices.

Table 13.25 ANNUAL SOCIAL TRANSFERS IN KIND—Current transfers to households

| Item | Comment |
|---|---|
| **Social transfers in kind** | Estimates of social transfers in kind are obtained as a by-product of the Government Finance Statistics.<br><br>For Commonwealth and State general government, data are extracted from administrative sources such as Commonwealth and State budget papers and Auditors'-General Reports, Commonwealth Department of Finance and Deregulation ledgers and supplementary departmental documents.<br><br>For local government a joint ABS/Commonwealth Grants Commission annual return, which is collected from each local government authority, provides the details required. |

## ADJUSTED DISPOSABLE INCOME ACCOUNT

### Actual final consumption

13.86 The concept of actual final consumption is aimed at recording consumption in the sector in which the good or service is actually consumed rather than in the sector than incurs the expenditure.

13.87 Household actual final consumption includes:

- the value of the households expenditures on consumption goods and services including expenditures on non-market goods or services sold at prices that are not economically significant;
- government final consumption expenditures on education, health, social security and welfare, sport and recreation and culture, which are considered to be individual services; and
- all services provided by non-profit institutions serving households as they are treated as individual services.

13.88 Government actual final consumption is equal to government final consumption expenditures on collective services. Whilst collective services benefit the community, or certain sections of the community, rather than government, the actual consumption of these services cannot be distributed among individual households, or groups of households. Therefore the actual consumption of these collective services is attributed to the government units that incur the corresponding expenditures.

13.89 Non-profit institutions serving households are included in the household sector in the ASNA, so their final consumption expenditures are automatically included in household actual final consumption. However, the value of the actual final consumption of NPISHs is equal to the value of its total final consumption expenditure less its expenditure on individual goods or services provided as social transfers in kind to

households. The value of the actual final consumption of NPISHs is thus equal to the value of the expenditures they incur on collective services.

13.90 The following table outlines the method used to calculate adjusted disposable income for both the general government and household sectors.

Table 13.26 ANNUAL ADJUSTED DISPOSABLE INCOME ACCOUNTS—by sector

| Item | Comment |
|---|---|
| **General government** | The general government adjusted disposable income account is compiled using data which is used to compile gross disposable income for general government.<br><br>The following outlines the calculation of adjusted disposable income:<br>Adjusted disposable income<br>*equals* Gross disposable income<br>*less* Social assistance benefits in kind<br>*less* Transfers of individual non-market goods and services<br><br>Note that the sum of Social assistance in benefits kind and transfers of individual non-market goods and services is described in the ASNA as Total outlays in kind<br><br>The use of adjusted disposable income is equal to actual collective consumption plus net saving, with net saving being the difference (i.e. the balancing item) between adjusted disposable income and the used of adjusted disposable income. |
| **Social assistance benefits in kind** | Social assistance benefits in kind relate to benefits paid by general government to the Household sector. Data from the following items is used to estimate the most significant amounts to be attributed to households from general government:<br>• Child care rebate,<br>• Pharmaceutical Benefits Scheme, and<br>• Medicare rebates and discounts for concession card holders.<br><br>These data are obtained from Government Finance Statistics. |
| **Transfers of individual non-market goods and services** | Transfers of individual non-market goods and services includes, most significantly, the expenditures on health and education services as well as any other individual good or services provided to households free, or at prices that are not economically significant.<br><br>Transfers of individual non-market goods and services are derived by subtracting the social assistance benefits in kind from the total outlays in kind where total outlays in kind is total government final consumption expenditure less actual collective consumption. |
| **Actual collective consumption** | Government actual final consumption, also referred to as actual collective consumption, is compiled using government final consumption expenditure data obtained from Government Finance Statistics.<br><br>The government final consumption expenditure data is classified according to the General Purpose Classification (GPC) and data for GPCs relevant to government actual final consumption are summed to form the estimate for actual collective consumption. They are<br>• General public service;<br>• Defence;<br>• Social security and welfare *(part);*<br>• Fuel and energy;<br>• Agriculture, forestry, fishing and hunting;<br>• Mining and mineral resources other than fuels; manufacturing |

and construction;
- Transport and communications;
- Other economic affairs; and
- Other purposes *(part)*.

**Household (including NPISH)**

The household adjusted disposable income account is compiled using data which is used to compile gross disposable income for households.

The following outlines the calculation of adjusted disposable income:

Adjusted disposable income
*equals* Gross disposable income
*plus* Social assistance benefits in kind
*plus* Transfers of individual non-market goods and services from general government

Note that the sum of Social assistance benefits in kind and transfers of individual non-market goods and services from general government is described in the ASNA as Social outlays in kind.

The use of adjusted disposable income is equal to actual individual consumption plus consumption of fixed capital, with the difference between adjusted disposable income and these uses being net saving (which is derived as a balancing item) between adjusted disposable income and the use of adjusted disposable income.

**Social assistance benefits in kind**

Social assistance benefits in kind relate to benefits paid by general government to the Household sector. Data for the following items is used to estimate the most significant amounts to be attributed to households from general government:
- Child care rebate
- Pharmaceutical Benefits Scheme,
- Medicare rebates and discounts for concession card holders.

These data are obtained from Government Finance Statistics.

**Transfers of individual non-market goods and services from general government**

Transfers of individual non-market goods and services from general government includes, most significantly, the expenditures on health and education services as well as any other individual good or services provided to households free, or at prices that are not economically significant.

Transfers of individual non-market goods and services from general government are derived by subtracting the social assistance benefits in kind from social transfers in kind where social transfers in kind is total government final consumption expenditure less actual individual consumption.

**Actual individual consumption**

Household actual final consumption, also referred to as actual individual consumption, is compiled using government final consumption expenditure data obtained from Government Finance Statistics.

The government final consumption expenditure data is classified according to the General Purpose Classification (GPC) and data for GPCs relevant to household actual final consumption (i.e. individual consumption) are summed with household final consumption expenditure to form the estimate for actual individual consumption. The GPCs are
- Education
- Health
- Social Security and Welfare *(part)*
- Housing and community amenities
- Recreation and Culture
- Other purposes *(part)*.

### Final consumption expenditure and actual final consumption: summary

13.91 Total final consumption in the economy may be viewed from two angles, that is:

- from the expenditure side as the total value of all expenditures on individual and collective consumption goods and services incurred by resident households, resident NPISHs and general government units; and
- in terms of actual final consumption, as the value of all the individual goods and services acquired by resident households plus the value of the collective services provided by general government to the community or large sections of the community.

13.92 The coverage of the goods and services is the same in both cases. In order to ensure that the values of the two aggregates are the same, the goods and services acquired by resident households through transfers in kind must always be valued at the prices at which they are valued in the expenditure aggregates, and the time of recording the goods and services acquired by transfers in kind must be the same as the time of recording in the expenditure aggregates. It is also assumed that the flows to non-residents are balanced by flows from government (and NPISHs) of other economies.

## AGRICULTURAL INCOME ACCOUNT

13.93 Historically there has been user demand to obtain more detailed data relating to the agriculture industry. It was a significant industry in the past so this level of detail was important for economic analysis. Although the significance of the agriculture industry in the Australian economy has declined over the years, there is still interest in this level of detail.

13.94 Agricultural income is the income accruing from agricultural production during an accounting period. It is equal to gross agricultural product at factor cost (i.e. gross value added at basic prices) less consumption of fixed capital, compensation of employees and net rent and interest payments.

13.95 Agricultural income is estimated both annually and quarterly. Quarterly current price and chain volume estimates are benchmarked to annual supply and use benchmarks at the same level of aggregation that appears in the Agricultural Income table (i.e. table 61) in the *Australian System of National Accounts* (cat. no. 5204.0). That is, agricultural output is benchmarked at the commodity level (or aggregations of 'like' commodities), and total intermediate use is benchmarked at the aggregate level. For output, this ensures that the weights of commodities in the quarterly system (in both current prices and in chain volume terms) are annually 'reset' to align with weights derived from the supply and use system, but the same does not occur for intermediate use owing to lack of detail.

13.96 Multiplicative seasonal adjustment is not appropriate for commodities where there is zero output in any given quarter. Sugar cane, wheat, and fodder and grass are examples of commodities where there is at least one quarter of zero output each year. To deal with this, a pseudo-additive decomposition method is applied to seasonally adjust these series. For more details on this, see paragraph 7.63.

13.97 The table below outlines the sources and methods used to calculate agricultural income.

Table 13.27 AGRICULTURAL INCOME, current prices

| Item | Comment |
|---|---|
| **Agricultural income** | Agricultural income is calculated using the current price values for gross value of production less intermediate inputs, less compensation of employees, consumption of fixed capital and net property income, less net taxes on production.<br><br>Gross value of production for agriculture is estimated using data collected in the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0) and is supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication.<br><br>Intermediate inputs are estimated using data published in the ABS publication *Value of Agricultural Commodities Produced* (cat. no. 7503.0) and is supplemented by annual data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication.<br><br>Compensation of employees is estimated using supply and use benchmarks for wages and salaries and employer social contributions and extrapolating the latest years using data from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication (Farm Costs and Returns – Labour). Annual data are split across the quarters using weights as allocators.<br><br>Consumption of fixed capital attributable to agriculture is estimated using 81% of the total consumption of fixed capital value for Agriculture, Forestry and Fishing. This is based on weights estimated from data published in *Australian Industry* (cat. no. 8155.0).<br><br>Net property income payable is calculated by summing farm interest, farm rent and third party insurance less FISIM. Data are sourced from the Australian Bureau of Agricultural and Resource Economics and Sciences *Agricultural Commodities* publication for interest paid, total overheads paid, farm management deposits and rates and taxes, as well as data from the Reserve Bank of Australia for small business other overdraft and total credit outstanding by sector. Annual data are split across the four quarters using a fixed proportion each quarter.<br><br>Taxes less subsidies on production is estimated using S-U benchmarks and extrapolating the latest year using the movement in current price value of total farm production, sourced from the Australian Bureau of Agricultural and Resource Economics and Sciences.<br><br>Income accruing to unincorporated farms, which contributes to gross mixed income for GDP(I), is estimated as gross value added for agriculture, less compensation of employees payable to farm employees, less income accruing to incorporated farms. |

# CHAPTER 14 THE CAPITAL ACCOUNT

## THE CAPITAL ACCOUNT AND ADDITIONAL COMPONENTS TO COMPILE THE CAPITAL ACCOUNT

### The capital account

14.1 In the 2008 SNA, the capital account is the first of four accounts dealing with changes in the values of assets held by institutional units. It records transactions in non-financial assets. The financial account records transactions in financial assets and liabilities. The other changes in the volume of assets account records changes in the value of both non-financial and financial assets that result from neither transactions nor price changes. The effects of price changes are recorded in the revaluation account. These four accounts enable the change in the net worth of an institutional unit or sector between the beginning and end of the accounting period to be decomposed into its constituent elements by recording all changes in the prices and volumes of assets, whether resulting from transactions or not. The impact of all four accounts is brought together in the balance sheets.

14.2 Assets are a store of value representing a benefit or series of benefits accruing to the economic owner by holding or using the entity over a period of time. The economic benefits that can be derived from the use of an asset consist of primary incomes (for example operating surplus generated by the use of the asset in production, or property income in the form of interest, dividends, rent etc., received by owners of financial assets and land) and the value, including possible holding gains or losses, that could be realised by disposing of assets. Assets consist of non-financial and financial assets. Liabilities are the counterparts of financial claims represented by financial assets (i.e. liabilities are the financial assets of the institutional units or non-residents holding a financial claim against the subject unit).

14.3 The purpose of the capital account is to record the values of the non-financial assets that are acquired, or disposed of, by resident institutional units by engaging in transactions and to show the change in net worth due to saving and capital transfers. Non-financial assets consist of produced assets which have come into existence as outputs of the production process, and non-produced assets which have come into existence through processes other than production.

14.4 In the capital account, net saving appears as a source of funds along with net capital transfers and consumption of fixed capital. The inclusion of consumption of fixed capital effectively means that the sources of finance are gross saving and capital transfers. These sources are offset by accumulation entries for gross fixed capital formation (GFCF), changes in inventories, and acquisitions less disposals of non-produced non-financial assets. The balancing item in the account is net lending (if positive) or net borrowing (if negative).

14.5 In the ASNA, the National capital account includes both details of the accumulation of assets and the means of financing them (as outlined below).The sectoral accounts are presented in the same way at the level outlined below but the next level down illustrates the flows between the sectors and they do not include transactions with non-residents.

**NATIONAL CAPITAL ACCOUNT**

| **FINANCING OF ACCUMULATION** | **ACCUMULATION** |
|---|---|
| Net saving | Gross fixed capital formation |
| Consumption of fixed capital | Changes in inventories |
| Net capital transfers receivable from non-residents | Acquisitions less disposals of non-produced non-financial assets |
| | Statistical discrepancy (E) less statistical discrepancy (I) |
| | Net lending to non-residents |
| **Gross saving and capital transfers** | **Total capital accumulation and net lending** |

14.6 The 2008 SNA's Other changes in volume of assets account and Revaluation account are not presented as separate accounts. Rather the details contained in these accounts are presented as part of ASNA's Balance sheets.

14.7 A net lending result implies an excess of capital finance over requirements for gross capital formation and net purchases of non-produced non-financial assets. A net borrowing result implies the existence of a borrowing requirement to finance capital acquisitions. Net lending/borrowing will therefore be reflected in changes in financial assets and liabilities in the financial account and is technically equal to the balancing item in that account. At the national level, the net lending/borrowing outcome in the national capital account indicates whether surplus funds are lent to the rest of the world or whether there is a borrowing requirement from the rest of the world to finance national capital formation. Net lending/borrowing in the national capital account is equivalent to the balance on current account and capital transactions in the balance of payments.

### Produced assets

14.8 There are three main types of produced assets: fixed assets, inventories and valuables. Both fixed assets and inventories are assets that are held only be producers for the purposes of production. Valuables may be held by any institutional unit and are primarily held as stores of value. However, valuables are not included within the asset boundary in the ASNA.

14.9 Fixed assets are non-financial assets that are used repeatedly and continuously in production processes for more than one year. They include:

- dwellings, including dwellings under construction and the value of alterations and additions to dwellings made by owner-builders;
- other buildings, including non-residential buildings and the fixtures, fittings and equipment that are integral parts of the buildings. Uncompleted buildings and structures are included. Buildings acquired for military purposes are also included;
- other structures, such as highways, railways, bridges, harbours, dams, pipelines, communication and power lines, constructions (other than buildings) for sport or recreation purposes. Structures acquired for military purposes are also included;
- ownership transfer costs;
- transport equipment, including motor vehicles, semi-trailers, ships, locomotives and aircraft. Transport machinery acquired by defence forces are included. Items of transport equipment acquired by households for final consumption are not treated as fixed assets;
- other machinery and equipment, including electrical apparatus, office accounting and computer equipment, furniture, fixtures and fittings not forming an integral part of buildings, durable containers, special tooling etc. Other equipment acquired by defence forces are also included;
- weapons systems;
- cultivated biological resources, consisting of :
    - livestock for breeding, dairy, draught etc. Livestock includes breeding stocks, dairy cattle, sheep or other animals used for wool production and animals used for transportation, racing or entertainment. In the ASNA, the range of assets of this type recorded is restricted to sheep raised for wool, dairy cattle and sheep and cattle kept as breeding stock; and
    - vineyards, orchards, and other plantations of trees yielding repeat products such as sap, resin, bark and leaf products.

14.10 Intellectual property products are also included as fixed assets. They include:

- research and development;
- mineral exploration, comprising the capitalised value of expenditures on exploration for petroleum, natural gas and mineral deposits;
- computer software, including the purchase of software, and software developed in-house if the expenditure is large. Expenditures on the purchase, development or extension of databases are also included. The ASNA does not separately identify databases from computer software, as recommended by the 2008 SNA; and
- entertainment, literary or artistic originals, comprising the originals of films, sound recordings, manuscripts, tapes etc. on which drama performances, radio and television programming, musical performances, sporting events, literary and artistic output etc., are embodied.

14.11 Inventories are produced assets that consist of goods and services which came into existence in the current period or in an earlier period, and that are held for sale, use in production or other use at a later period. They include materials and supplies intended to be used as inputs to production, work-in-progress, finished

goods and goods purchased for resale without further processing. Work-in-progress includes the value of livestock raised for the purpose of slaughtering or eventual sale, and trees or other vegetation yielding once-only products (such as timber plantations).

14.12 Valuables are held as a store of value and include precious metals and stones not held for use as inputs to production, antiques, works of art and other valuables such as collections of jewellery of significant value. Due to data limitations, valuables are not currently included within the boundary of produced assets in the ASNA.

### Non-produced assets

14.13 Non-produced assets are non-financial assets that occur in nature and over which ownership may be enforced or transferred. Environmental assets over which ownership cannot be attributed, such as international waters or air, are excluded. In ASNA non-produced assets consist of natural resources and contracts, leases and licences.

14.14 Natural resources include the following:

- land, including the value of land underlying dwellings, non-residential buildings and structures, land under cultivation, recreational land and associated surface water and private gardens and plots not cultivated for commercial purposes;
- subsoil assets, such as proven and exploitable reserves of coal, oil, natural gas, metallic and non-metallic mineral reserves;
- native standing timber available for commercial exploitation; and
- radio spectrum.

14.15 Water resources which are subject to some form of ownership or use rights, market valuation or some measure of economic control are conceptually included but, due to data limitations, they are not included in the ASNA.

14.16 Contracts, leases and licences entitle their owners to engage in certain specific activities or to produce certain specific goods or services and to exclude other institutional units from doing so except with the permission of the owner. Included are patents, broadcasting licences, other transferable contracts and spectrum licences.

14.17 Purchased goodwill and marketing assets are classified as non-produced assets. However, due to data limitations these are not included in ASNA.

## Additional components to compile the capital account

14.18 The starting point of the capital account is net saving which is the balancing item of the income account. If net saving is positive it represents that part of disposable income that is not spent on consumption goods and services and must, therefore, be used to acquire non-financial or financial assets or to repay liabilities. If net saving is negative then final consumption exceeds disposable income which must be financed by disposing of assets or incurring liabilities.

14.19 In order to determine the amount available to the unit or sector for the acquisition of non-financial and financial assets it is necessary to also take into account the consumption of fixed capital and capital transfers in addition to net saving. The result of this is gross saving and capital transfers which can then be used to acquire or dispose of non-financial assets. The acquisition and disposal of non-financial assets are accounted for by GFCF, changes in inventories and acquisitions and disposals of non-produced non-financial assets.

14.20 Therefore the additional components required to compile the capital account are:

- consumption of fixed capital;
- acquisitions less disposals of non-produced non-financial assets; and
- capital transfers.

## CONSUMPTION OF FIXED CAPITAL

### Introduction

14.21 Estimates of the capital stock of the Australian economy, together with the value of capital assets used up in the productive process (called depreciation in commercial accounting or consumption of fixed capital in the national accounts) and the flow of capital services to the productive process, are produced using an application of the perpetual inventory model (PIM). Estimates of capital stock and capital consumption are calculated for all fixed assets that are owned by producers. These measures are expressed in current prices and also as chain volume measures.

14.22 Capital stock estimates provide information about the stock of capital available in an economy at a particular point in time. Three measures of capital stock can be distinguished: gross, net and productive.

1. The value of an economy's *gross capital stock* is obtained by valuing each asset in use at the current price of a new asset of the same type, regardless of the age of the asset. It is calculated as the accumulation of past investment flows less retirements, at 30 June each year, before the deduction of any allowances for consumption of fixed capital.

2. *Net (or economic) capital stock* estimates are the written down values of an economy's gross capital stocks. They represent the net present values of the future capital services to be provided by the assets. The difference between the net and gross value of an asset is accumulated depreciation. Net capital stock is essentially a measure of wealth and is shown in an economy's balance sheet.

3. *Productive capital stock* estimates are derived by writing down each asset in accordance with its decline in efficiency due to age. If, for example, an asset is 75 per cent as efficient as a new asset of the same type, then the productive value of that asset is 75 per cent of the value of the new asset. Efficiency tends to decline with age, as older assets require more frequent and extensive maintenance and more replacement parts. Productive capital stock estimates are a measure of productive capacity and they form the basis for the measure of capital services required for productivity analyses.

#### Relationship between productive capital stock and net capital stock

14.23 Although the concepts of productive and economic capital are quite different they are intimately related: for any particular asset, given the real productive capital stock and a suitable discount rate we can determine the real economic (i.e. net) capital stock and, after reflation, the current price economic capital stock. The age-efficiency function (after being multiplied by a suitable scalar) defines how the flow of real capital services from an asset declines over an asset's life. The real economic value of an asset at any time can be calculated - given a discount rate - as the sum of discounted future real flows of capital services. Once the real economic values of an asset are determined over its lifespan an age-price function can be derived. The age-price function defines how the net capital stock of an asset declines as it ages in real terms. Unlike net capital stock, productive capital stock is a concept that is really only applicable to the stock of a single type of asset. It is best aggregated over different types of assets by using rental prices as weights. The resulting aggregate is then used to produce a volume index of capital services.

14.24 The scope of capital stock is defined by the coverage of GFCF.

### Consumption of fixed capital and capital services

14.25 Two flow concepts are relevant to capital stocks:

1. *Consumption of fixed capital* (COFC) represents the value of a capital asset that is 'used up' in a particular period. The real consumption of fixed capital of an asset in a period is the difference in the real economic value of the asset at the beginning of the period and at the end of the period. Consumption of fixed capital is based on the concept of the expected economic lifetime of an asset and is designed to cover the loss in value due to normal wear and tear, foreseen obsolescence, and the normal amount of accidental damage which is not made good by repair. Unforeseen obsolescence is treated as a capital loss rather than as consumption of fixed capital.

2. *Capital services* reflect the amount of 'service' each asset provides during a period. For each asset, the services provided in a period are directly proportional to the asset's productive capital value in the period. As an asset ages and its efficiency declines so does the productive capital value and the services the asset provides. In equilibrium, the value of capital services is equal to the gross returns (or rentals) to owners of capital, i.e. the sum of COFC during the period and a return on the net capital stock of assets. The relationship between the capital services provided by an asset and the asset's productive value is fixed over the asset's life. However, this relationship varies from asset to asset and it depends on an asset's expected life, the discount rate, and the rate of decline in the asset's efficiency.

#### Relationship between consumption of fixed capital and the flow of capital services

14.26 Consumption of fixed capital is always less than the value of the capital services, since the return to the owner of the asset must also cover the interest (or capital) cost of holding the asset. In other words, the value of the service has not only to cover depreciation but provide a return to the owner of the asset sufficient to cover the interest cost. More explicitly, in any given period, consumption of fixed capital is equal to the value of the capital services provided by the asset, minus the return to the owner of the asset.

### Valuation of capital stock and consumption of fixed capital

14.27 Capital stock and consumption of fixed capital are presented in the ASNA in current prices and as chain volume measures. The chain volume measures are referenced to the average values in the reference year.

#### Capital stock measurement

14.28 There are two broad approaches to the measurement of capital stock:

- direct measurement, as the name implies, involves direct approaches to owners of fixed capital assets to obtain estimates of their capital stock. Such data have not been collected for Australia.
- the perpetual inventory model (PIM) involves the compilation of a 'rolling' inventory of capital stocks; in any particular period, investment in capital assets is added to stocks, and retired assets are deducted. To apply the PIM, the following are generally required:
    - the average length of asset lives, i.e. average of the length of time they are used in production;
    - the extent to which assets are retired before, on or after the average asset life for that asset - the retirement distribution. Alternatively, retirements can be expressed as a survival function;
    - the age-price function of assets (used to derive net capital stock estimates and estimates of consumption of fixed capital);
    - the age-efficiency function of assets (used to derive productive capital stock estimates);
    - gross fixed capital formation (GFCF) for the period for which the capital stock estimate is required and for periods prior to that period equal to the maximum life of the asset; and
    - price indexes for the entire timespan of GFCF.

#### Obsolescence and consumption of fixed capital

14.29 Obsolescence occurs when an event occurs which causes an otherwise useful asset to become less useful or useless. Examples include immovable assets at a remote mine site when the mine is worked out, a building that fails to meet new health and safety regulations or, very commonly, technical innovation. As time passes technical innovation occurs, leading to the availability of assets that are superior in some way to assets previously available that performed a similar function. An example is a new model of computer that has superior performance to previous models, but is not commensurately more expensive. New, desirable software becomes available which only the new computers can support. Demand for the new, superior computers is strong while the demand for older-style computers declines sharply, and the older-style assets in service are retired before they are worn out.

14.30 Obsolescence is time-dependent, not age-dependent. All vintages of an older style asset suffer obsolescence at the same time. For many types of asset there is a history of regular technical innovation that leads purchasers to expect further innovations in the future. Computer equipment is an asset of this type.

Purchasers of computer equipment can expect rapid technical innovation to make an asset bought today obsolete in a few years time. While computers might be expected to give relatively trouble free service for many years their economic lives are much shorter. As a consequence the values of assets such as computer equipment fall rapidly and their rate of COFC is high.

14.31 If obsolescence is foreseen then it is factored in by the owner in determining the asset's expected economic life, and hence its expected value and depreciation in future periods. Therefore, when the event causing the foreseen obsolescence occurs there is not an abrupt fall in the value of the asset. Foreseen obsolescence is included in COFC in the national accounts because it is an expected cost of production. If there is a loss in value of an asset due to obsolescence that is not foreseen then it should be recorded in the other changes in the volume of assets account and not in COFC. In general it is assumed in the Australian national accounts that all obsolescence is foreseen.

14.32 If proper account is taken of quality changes in the compilation of price indexes then they will reflect relative price falls when technical innovation occurs. As a consequence, if such price indexes are used to deflate capital formation of a type of asset that undergoes a technical innovation, the resulting volume estimates of older-style and new-style assets will be comparable because the price indexes used to deflate the current price values of the old- and new-style assets reflect the difference in quality between the two.

14.33 The age-price functions referred to above are in real terms. Therefore, providing they do not change over time (due to the rate of foreseen obsolescence changing or changes in asset reliability, etc.), the same age-price function is applicable to both different vintages of the same asset type at any particular time or to any particular vintage of an asset type over time. For most asset types it is assumed that the age-price function is constant. There are some exceptions for which slowly changing economic lives are prescribed and, as a result, the age-price functions of these asset types change slowly over time. In these cases it is the same suite of age-price functions that is applicable both to different vintages of the same asset type at any particular time and to any particular vintage of an asset type over time. Thus the same suite of age-price functions can be used to permit the aggregation of different vintages of the same asset type at a particular time to obtain estimates of net capital stock, or they can be used to calculate the change in value of assets over time - COFC - in volume terms.

14.34 It is evident from the foregoing that volume estimation is an essential first step in estimating capital services, net capital stock and COFC.

## Age-efficiency, age-price and depreciation rate functions

### Age-efficiency functions

14.35 There is a lack of empirical data about the shape of age-efficiency functions and the choice is a matter of judgement. Although capital stock levels are sensitive to the shape of the age-efficiency function, average growth rates are not. (In fact, if real GFCF is held constant over time, the choice would have no impact on the capital stock growth rate, but it would affect the capital stock level.) The ABS has chosen to use hyperbolic functions, the same approach as that used by the US Bureau of Labor Statistics (BLS). In a hyperbolic function, the efficiency of the asset declines by small amounts at first and the rate of decline increases as the asset ages.

14.36 Hyperbolic decline has the form:

$$E_t = \frac{M - A_t}{M - bA_t}$$

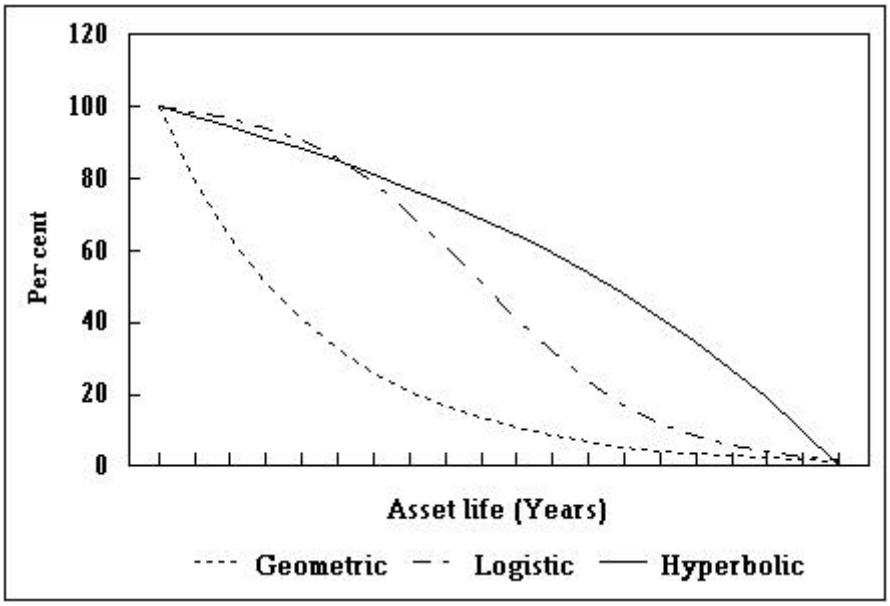
where $E_t$ is the efficiency of the asset at time t (as a ratio of the asset's efficiency when new).
M is the asset life as per the Winfrey distribution (discussed below)
$A_t$ is the age of the asset at time t
b is the efficiency reduction parameter.

14.37 The efficiency reduction parameter *b* is set to 0.5 for machinery and equipment, and 0.75 for structures - the same parameter values as used by the US BLS. The higher value for non-dwelling construction redistributes efficiency decline to occur later in the asset's life, relative to machinery and equipment, the efficiency decline of which is distributed more evenly throughout the asset's life. For computer software, *b* is set to 0.5. For

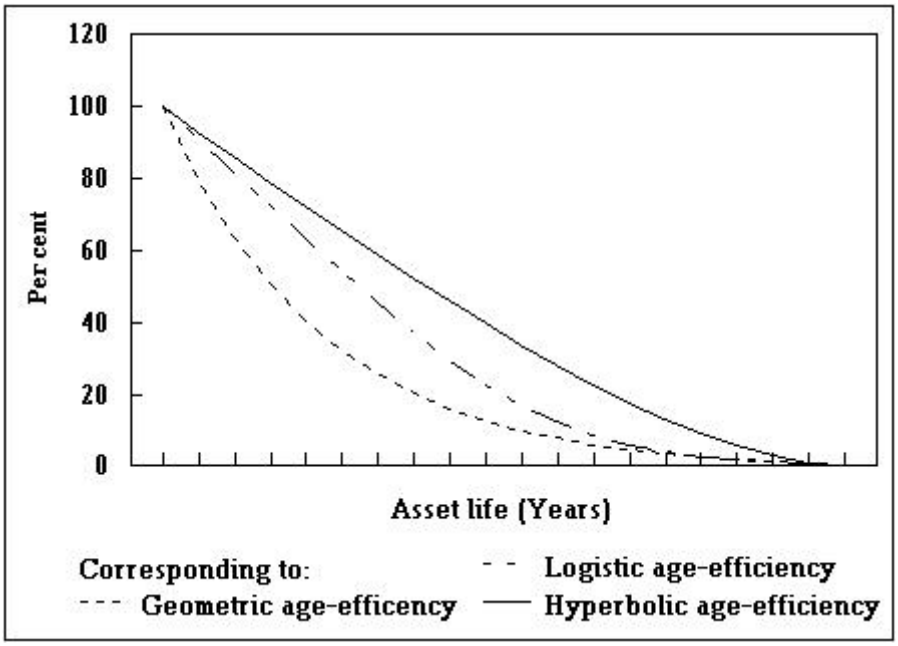
livestock, *b* is also set to 0.5. Clearly, a more accurate age-efficiency function and age-price function could be assumed by recognising that livestock are immature for a number of years before they begin service as mature animals. However such improvements compromise model simplicity and the improvements from doing so would be quite small. For mineral exploration *b* is set to 1, implying that there is no efficiency decline in exploration knowledge. The opposite is the case for artistic originals, where b is set to 0, implying straight-line efficiency decline.

14.38 Graphs below show (i) the main types of age-efficiency functions and (ii) the age-price functions relating to each of the age-efficiency functions. When the hyperbolic functions for each of the possible lives of an asset are weighted together (as per the Winfrey distribution), the resulting average age-efficiency function resembles a logistic function with a point of inflection towards the end of its maximum life.

Graph 14.1 AGE-EFFICIENCY FUNCTIONS




Graph 14.2 AGE-PRICE FUNCTIONS



### Age-price functions

14.39 Age-price functions are calculated using average age-efficiency functions and a real discount rate. The age-efficiency function describes the decline in the flow of capital services of an asset as it ages. Using the discount rate, the net present value of future capital services can be readily calculated. For instance, when multiplied by a suitable scalar, the first value of the age-price function represents the present discounted value of the capital services provided by an asset over its entire life. The second value of the age-price function represents the present discounted value of the capital services provided by an asset from the end of its first year until the end of its life. The third value represents the present discounted value of the capital services provided by an asset from the end of its second year until the end of its life, and so on. Age-price functions are normalised and adjusted for mid-year purchase, to allow for some consumption of fixed capital occurring in the first year. The ABS has chosen a real discount rate of 4 per cent, the same as that used by the US BLS and which approximates the average real 10 year Australian bond rate.

14.40 When the net present values of the different assets are aggregated for a particular period, they form the net capital stock for that period.

### Depreciation rate functions

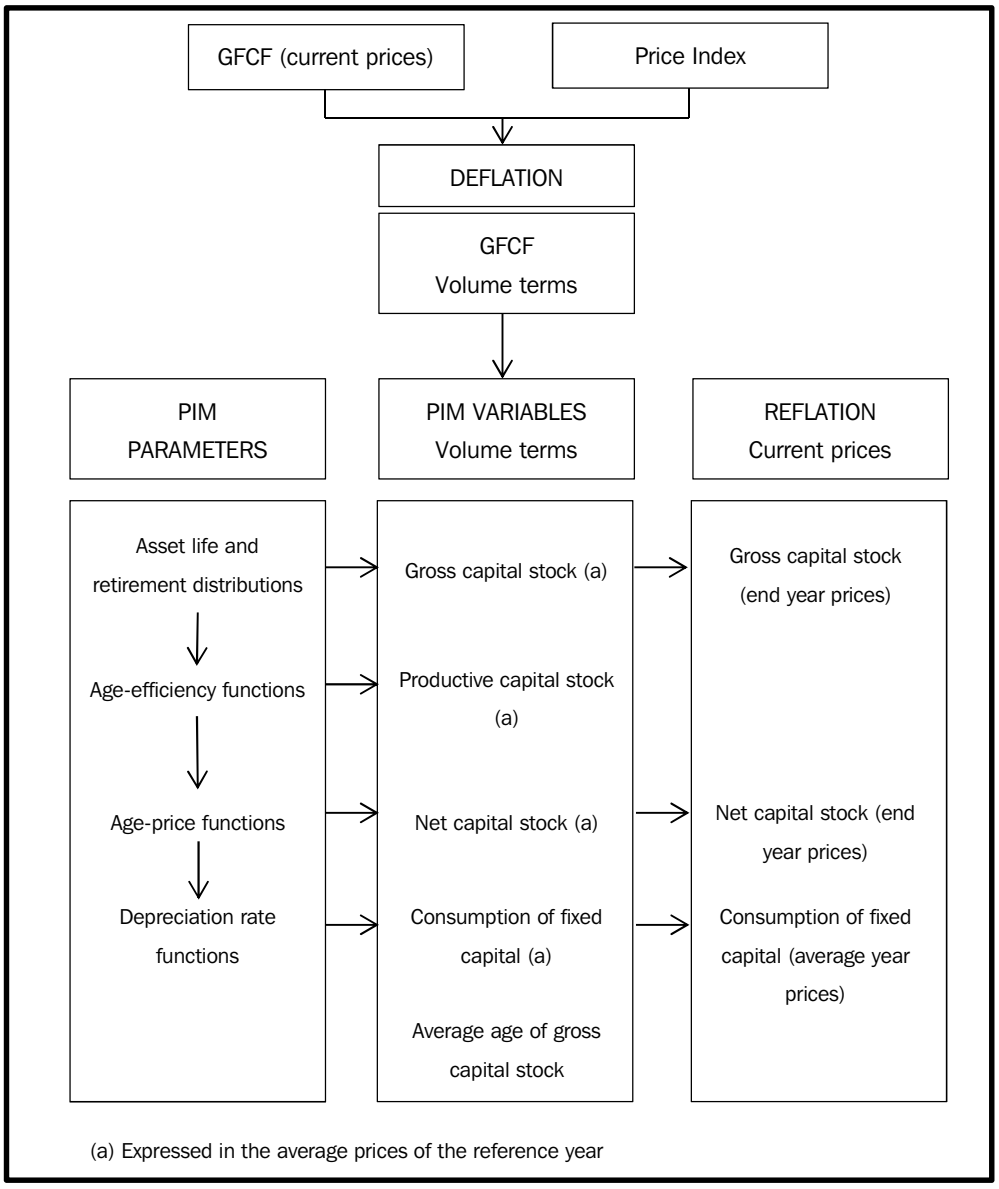
14.41 In real terms, depreciation (or COFC) is the difference between the real economic value of the asset at the beginning of the period and at the end of the period. The depreciation rate function is calculated as the decline in the age-price function between assets of consecutive ages. When multiplied by a suitable scalar, it shows the pattern of real economic depreciation or COFC over an asset's life. Consumption of fixed capital for each vintage of each asset type is then aggregated to form the total consumption of fixed capital for that period. It can also be calculated as GFCF less the net increase in the net capital stock (i.e. GFCF less the difference between the net capital stock at the end of the period and at the beginning of the period).

Sources and methods – Annual

The Perpetual Inventory Model (PIM)

14.42 The PIM measures COFC annually. The steps involved in applying the PIM are summarised in the chart below.

- THE PIM PROCESS




14.43 The PIM is applied to volume estimates of GFCF at a detailed level (i.e. for a particular asset type for a particular industry in a particular institutional sector). Volume estimates of net and productive capital stock and consumption of fixed capital are compiled using vector multiplication. The product of two vectors results in a value for a particular period. The first vector represents the age-efficiency or age-price or COFC pattern from when the fixed asset is new to the end of its life. The second vector is always the GFCF series. Shifting the second vector (GFCF) one year at a time before multiplying with the first vector results in a time series of values of capital stock or consumption of fixed capital, depending on the vector used.

14.44 For instance, gross capital stock at the end of period *t* is the product of the survival function and GFCF vectors. The first element of the GFCF vector is the value for period *t*, the second element is the value is for

period *t-1*, the third is for period *t-2*, and so on. The final element is the value for period *t-m*, where *m* is the maximum possible life of the asset. A survival function represents the probability that a fixed asset is still in service and is derived from the asset life distribution. When the asset is new, the survival probability is equal to 1, but as it ages the survival probability declines, until it reaches zero. At the end of its life the asset is assumed to have a zero scrap value (in practice, it is recognised that positive and negative scrap values can occur but no attempt has been made to quantify the net effect of these). The survival function can be constructed by subtracting, for each period, the probability of retirement in that period.

14.45 Productive capital stock is the product of the average age-efficiency function (AAE) and GFCF vectors. The AAE for a particular asset age is calculated as a weighted average of the efficiency functions for each possible length of life, using the probability of retirement as weights.

14.46 Net capital stock is the product of the age-price function and GFCF vectors. Age-price functions are calculated using the AAE and a real discount rate in the following way. The present discounted value of the future stream of capital services from when the asset is new until the end of its life gives the first value of an age-price function, the present discounted value of the future stream of capital services from when the asset is one year old until the end of its life gives the second value, and so on. Age-price functions are normalised and adjusted on the assumption that all of GFCF in a year occurs mid-year.

14.47 COFC is the product of the depreciation rate function and GFCF vectors. The depreciation rate function is calculated as the decline in the age-price function between assets of consecutive ages.

14.48 Current price estimates at the most detailed level of estimation of gross capital stock, net capital stock and consumption of fixed capital are obtained by reflating the volume estimates. The price indexes used to reflate the volume estimates are the same as those initially employed to deflate GFCF except that, for capital stocks, they are adjusted to an end year basis by averaging consecutive values of the price indexes. For reflated consumption of fixed capital, which is a flow concept, the price indexes are not adjusted to an end of year basis. The resulting elemental series at current prices are aggregated to the level published, while elemental volume measures are aggregated to form chain volume measures at the level published. Elemental estimates of capital stock satisfy the following identities:

$$GKS_t = GKS_{t-1} + GFCF_t - R_t$$

$$NKS_t = NKS_{t-1} + GFCF_t - COFC_t$$

$$GKS\$_t = (GKS_{t-1} + GFCF_t - R_t) * (PI_t + PI_{t+1}) / 2$$

$$NKS\$_t = (NKS_{t-1} + GFCF_t - COFC_t) * (PI_t + PI_{t+1}) / 2$$

where
- $GKS_t$ = deflated gross capital stock in period t
- $NKS_t$ = deflated net capital stock in period t
- $GKS\$_t$ = gross capital stock in current prices at end of period t
- $NKS\$_t$ = net capital stock in current prices at end of period t
- $GFCF_t$ = deflated gross fixed capital formation in period t
- $R_t$ = deflated retirements in period t
- $COFC_t$ = deflated capital consumption in period t
- $PI_t$ = price index in period t
- \$ denotes the current dollar equivalent of the respective deflated series.

Note $R_t$ is not included in the net estimates above as it is included in COFC.

14.49 Average age of the gross capital stock at the end of each year is another output of the PIM. Average age is the age at 30 June of past years' GFCF weighted by their proportions of the surviving gross capital stock. These calculations assume an average mid-year purchase.

### Current price GFCF

14.50 The GFCF data required as input into the PIM are consistent with those described previously and published in *Australian System of National Accounts* (cat. no. 5204.0).

14.51 GFCF data by asset type (i.e. dwellings, non-dwelling construction, machinery and equipment, cultivated biological resources, computer software, mineral exploration and entertainment, literary or artistic originals, ownership transfer costs, research & development and weapons systems) are further classified by institutional sector and industry/purpose.

14.52 A number of problems with the generation of detailed capital formation estimates affect the reliability of estimates produced by the PIM. In particular, sector and industry estimates of private GFCF on machinery and equipment should be interpreted cautiously because the data available to adjust estimates in accordance with Australian Accounting Standard 17 (Accounting for Leases) are not as detailed as ideally required. Also, the Economic Activity Survey, which is the major data source used to dissect private GFCF on non-dwelling construction into institutional sectors and industries, excludes transactions in second-hand assets.

14.53 The first years for which estimates of capital stock and COFC have been published are 1966-67 and 1948-49, respectively. 1948-49 is the first year for which most national accounts data have been compiled by the ABS. Although the national accounts are compiled from 1959-60, in order to estimate capital stock and consumption of fixed capital from 1966-67 and 1959-60, respectively, estimates of GFCF are required for much earlier years. The length of the detailed GFCF series required varies depending on the particular mean asset life and asset life distribution applicable to that series.

14.54 Estimates of GFCF for years prior to 1948-49 are generally less accurate than those since 1948-49. However, because of the retirement of older assets and the rapid growth of the Australian economy since World War II, the early data have relatively little impact on the present estimates.

14.55 Estimates for years prior to 1948-49 are prepared using various sources including Butlin[31], and ABS data from issues of Production Bulletins, Primary Industry Bulletins, Secondary Industry Bulletins, Finance Bulletins, Transport and Communication Bulletins, State Statistical Registers and Australian and State Year Books.

14.56 Estimates of general government capital stock and consumption of fixed capital are calculated using the PIM by government purpose category. Estimates by purpose are then transformed into industries to obtain general government capital stock and consumption of fixed capital by industry. As the relationship between the government purpose classification and the ANZSIC is complex, this can only be done on an approximate basis.

### Price indexes

14.57 The price indexes used in the PIM are the same as those used in the preparation of chain volume estimates of GFCF. However the latter, with the exception of non-produced fixed asset estimates, are only compiled as chain volume estimates back to 1985-86. They are then linked to previously compiled constant price estimates at base years generally five years apart.

14.58 In contrast, the volume estimates derived as a means of estimating the capital stock related statistics are compiled all in one piece. The same is true for the reflation to derive current price estimates and chain volume estimates. This process requires the compilation of continuous price indexes going much further back in time than those required for the gross domestic product account.

[31] Butlin N. G., *Australian Domestic Product, Investment and Foreign Borrowing, 1861 - 1938/39*, Cambridge 1962.

14.59 For all categories other than construction, the price indexes extend no further back than 1948-49, but for construction they extend much further back. For years prior to 1948-49, the following price indexes are used:

- Dwellings and non-dwelling construction other than roads - a general building price index derived from Haig[32] for the years 1938-39 to 1948-49. For the years 1866 to 1938-39, a price index derived from Butlin.
- Roads - a roads price index derived from Keating[33], and Bureau of Transport Economics data (1941-42 to 1947-48).

14.60 As with the GFCF data, the poorer quality of early data should be considered in the light of its small contribution to more recent capital stock levels. Furthermore, unlike GFCF, most price indexes tend to be reasonably highly correlated over time.

14.61 The underlying price indexes from which the GFCF price indexes are compiled relate to a number of different base periods because of the length of the time series required. For example, ABS price indexes with base years of 1953-54, 1959-60, 1966-67, 1974-75, 1979-80, 1984-85 and 1989-90 are used, as well as non-ABS price indexes prior to 1948-49 which have earlier base years. Therefore, it is necessary to splice the price indexes with different base periods on the basis of relationships in overlapping periods.

14.62 Although only one price index series results for each item, it is a hybrid of several series. When the current price values of machinery and equipment purchased in 1949-50 are calculated for example, price indexes for the early 1950s are used which reflect the composition of GFCF in 1953-54. In the mid to late 1950s, price indexes which reflect the composition of GFCF in 1959-60 are used, etc.

### Mean asset lives

14.63 The mean asset lives are the most important of the parameters used in the PIM. Together with asset life distributions, and the age-efficiency functions, they determine when assets are retired from the gross capital stock, the net capital stock, and the rate of depreciation charged. Six main data sources are used to derive estimates of mean asset lives:

- implicit tax lives;
- weighted prescribed tax lives;
- asset lives used by businesses to calculate depreciation for their own purposes;
- survival rates for vehicles in the motor vehicle fleet derived from data on new vehicle registrations and the motor vehicle census;
- technical information on the operating lives of various types of machinery from manufacturers' specifications; and
- asset life estimates from other OECD countries.

#### *Changes in asset lives over time*

14.64 Asset lives are influenced by a large number of variables, which may either increase or decrease asset lives over time. These variables include changes in rates of use, technological advances and quality changes.

14.65 In the case of motor vehicles there is strong evidence that mean lives have increased over the past fifty years, and these increases have been incorporated in the PIM for estimating the capital stock.

14.66 It is possible that the lives of other classes of assets have also changed, but there is no conclusive evidence to demonstrate that this has occurred.

14.67 While the lives of particular classes of assets may change over time, the average life span of all capital equipment also changes as a result of the changes in the composition of capital formation. This effect has

[32] Haig B.D., *Capital Stock in Australian Manufacturing*, Department of Economics, Research School of Social Sciences, Australian National University, Canberra 1980.
[33] Keating M., *The Growth and Composition of the Australian Workforce 1910-11 to 1960-61*; thesis submitted to the Australian National University, Canberra, 1967.

been captured to some extent by breaking expenditure on machinery and equipment down into six major classes.

14.68 Since the 1960s there has been a steady increase in the use of computers, which in 1997-98 comprised about 12 per cent of capital formation on machinery and equipment. Computers are a relatively short lived item of equipment and the increase in their use has had the effect of reducing average equipment lives.

14.69 The increased use of computers and the increased lives of motor vehicles have offsetting effects, with the net impact on equipment lives differing between industries according to the relative weights of computers and motor vehicles in their machinery and equipment expenditure. In industries where motor vehicles form a high proportion of machinery and equipment expenditure, such as agriculture, average lives have increased, while for industries such as finance and insurance, where computers form a relatively high proportion of capital formation, average equipment lives have fallen.

*Machinery and equipment*

14.70 Asset lives are estimated for the six classes of machinery and equipment. In calculating average asset lives, implicit tax lives (based on the inverse of the depreciation rates published in the 1997 *Master Tax Guide*) are used as a basic source of information. While implicit tax lives may change over time, they are regarded as being of insufficient accuracy to calculate changes in economic lives over time. They are, however, industry based and comprehensive in coverage. In principle they are based on industry information about the actual service lives of machinery and equipment. Nevertheless, information from other sources suggests that tax lives are, in general, shorter than economic lives, and additional sources have been used to estimate the actual economic lives of the various types of machinery and equipment.

14.71 The additional information sources are less comprehensive in coverage than the tax data, so selected items of machinery and equipment have been used to estimate ratios of tax lives to economic lives. The general approach has been to calculate a weighted average tax life for the various types of machinery and equipment employed in each industry, then supplementary sources, such as technical data and information collected from industry sources have been used to estimate the economic lives of assets employed in those industries. Where no new information on economic lives has been available the estimates developed by Walters and Dippelsman have been adopted (Australian Bureau of Statistics *Estimates of Depreciation and Capital Stock, Australia* (Occasional Paper No. 1985/3)). A ratio of economic lives to average tax lives has then been calculated. This ratio has been applied to all machinery and equipment employed in the industry to determine an average economic life.

14.72 The ratio of economic lives to tax lives differs between industries. For example, much of the machinery and equipment used in agriculture is similar to machinery and equipment used in mining and construction, and particular items of machinery and equipment, such as tractors, generally have the same prescribed tax life regardless of the industry in which they are employed. However, work practices differ between industries, with machinery and equipment engaged in agriculture generally being used less intensively than similar equipment in the construction or mining industries. Therefore, agricultural equipment can be expected to last longer than similar equipment engaged in construction or mining, and so the ratio of economic lives to tax lives is higher for agriculture than for construction or mining. In some cases the lives of particular classes of machinery and equipment differ between industries; this is notably so in the case of electrical equipment. In the electricity, gas and water industry, electrical equipment is estimated to have an average life of twenty years, compared with an average life of 11.6 years for electrical equipment in other industries. This difference is due to an allowance being made for the longer life of the heavy electrical equipment used in the electricity, gas and water industry.

14.73 Asset lives for machinery and equipment in 1996-97 are reported in the table below for each industry. Due to a lack of information as to whether asset lives have been lengthening or shortening, the asset lives of all categories other than road vehicles and computers are held constant.

14.74 In the case of road vehicles, which constitute over 30 per cent of GFCF on machinery and equipment, average lives have been estimated using data on new vehicle registrations and the age composition of the vehicle fleet. Data are published in *New Motor Vehicle Registrations, Australia: Preliminary* (cat. no. 9301.0) and *Motor Vehicle Census, Australia* (cat. no. 9309.0). For the census years, the number of vehicles of each vintage surviving in the stock has been related to the number of new registrations in the year of manufacture to calculate the percentage of survivals from the respective vintages. The results show a general decline over time as the older vehicles drop out of the stock. The point at which 50 per cent of vehicles manufactured in a particular year remain in the stock gives the median life of vehicles manufactured in that year. For example, if 50 per cent of the vehicles manufactured in 1960 (or more precisely first registered in 1960) remain in the stock in 1972, then this implies that the median life of vehicles manufactured in 1960 is 12 years. This technique has been used to estimate vehicle lives at the census dates, and lives for the

intervening years have been calculated by interpolation. It is not possible to precisely calculate mean lives, as a proportion of vehicles have lives exceeding the range covered by the data available. However, analysis of the age distribution suggests that the median is a close approximation to the mean.

14.75 Vehicle lives are estimated using the above approach from 1950. Over the period 1950 to 1979 motor vehicle lives increased from 13 years to 18.5 years. It is not possible to measure the median lives of vehicles manufactured until half of them have actually lived out their lifespan and so for recent years this method is not applicable. For recent years a combination of data for the average age of the vehicle fleet and trends in the age profile of the fleet are used to project trends in vehicle lives. It is estimated that the median life of motor vehicles manufactured in 1997 is 20.5 years.

14.76 The average life of computer equipment is assumed to have gradually declined from eight years in 1960 to five years in 1997-98. This change is attributed to the decline in the proportion of mainframe computers relative to PCs and the longer lives of the former.

14.77 The table below outlines the mean asset lives (years) for machinery and equipment (excluding weapons systems) by type of equipment and industry.

Table 14.1 MEAN ASSET LIVES (YEARS) —Machinery and equipment lives by type of equipment and industry

| Industry | Computers & peripherals | Electrical & electronic equipment | Industrial machinery & equipment | Motor vehicles | Other transport equipment | Other plant & equipment |
|---|---|---|---|---|---|---|
| Agriculture, forestry & fishing | 4.9 | 16.0 | 21.2 | 19.4 | 16.0 | 17.3 |
| Mining | 4.9 | 17.3 | 17.3 | 19.4 | 17.3 | 16.0 |
| Manufacturing | 4.9 | 13.4 | 15.1 | 19.4 | 13.4 | 12.1 |
| Electricity, gas, water & waste services | 4.9 | 30.4 | 20.1 | 19.4 | 18.2 | 17.3 |
| Construction | 4.9 | 13.4 | 15.1 | 19.4 | 13.4 | 12.1 |
| Wholesale trade | 4.9 | 18.2 | 15.1 | 19.4 | 18.2 | 17.3 |
| Retail trade | 4.9 | 18.2 | 20.1 | 19.4 | 18.2 | 17.3 |
| Accommodation, & food services | 4.9 | 18.2 | 20.1 | 19.4 | 18.2 | 17.3 |
| Transport, postal & warehousing | 4.9 | 18.2 | 20.1 | 19.4 | 18.2 | 17.3 |
| Information media, & telecommunications | 4.9 | 15.1 | 17.3 | 19.4 | 15.1 | 14.4 |
| Finance and insurance services | 4.9 | 15.1 | 17.3 | 19.4 | 15.1 | 14.4 |
| Rental hiring & real estate services | 4.9 | 15.1 | 17.3 | 19.4 | 15.1 | 14.4 |
| Professional, scientific and technical services | 4.9 | 15.1 | 17.3 | 19.4 | 15.1 | 14.4 |
| Administration & support services | 4.9 | 15.1 | 17.3 | 19.4 | 15.1 | 14.4 |
| Public administration & safety | 4.9 | 15.1 | 17.3 | 19.4 | 15.1 | 14.4 |
| Education and training | 4.9 | 17.3 | 19.4 | 19.4 | 17.3 | 16.0 |
| Health care and social assistance | 4.9 | 15.1 | 17.3 | 19.4 | 15.1 | 14.4 |
| Arts and recreation services | 4.9 | 17.3 | 19.4 | 19.4 | 17.3 | 16.0 |
| Other services | 4.9 | 17.3 | 19.4 | 19.4 | 17.3 | 16.0 |

Weapons systems

14.78 The ABS has undertaken research on asset lives and retirement functions for each equipment type (aircraft, ships, ground equipment) and has decided to use previous work undertaken by the United States Bureau of Economic Analysis to determine the asset lives for weapons systems.

14.79 Simulations for asset lives of 5 years, 10 years and 20 years were undertaken and compared with the depreciation estimates published by the Department of Defence. Both sets of comparisons support the plausibility of an asset life around 20 years.

Table 14.2 MEAN ASSET LIVES (YEARS) —Weapons systems

| | Mean life (years) |
|---|---|
| Weapons systems | 20 |

*Non-dwelling construction*

14.80 The estimated average lifespan of non-dwelling construction (including alterations and additions) are given in the table below. These estimates are based on the findings of Walters and Dippelsmann.

14.81 These estimates have been checked against data on the age of buildings demolished in the Sydney and Melbourne central business districts over a ten year period. The Sydney and Melbourne data broadly support the age estimates used by Walters and Dippelsman (Australian Bureau of Statistics *Estimates of Depreciation and Capital Stock, Australia* (Occasional Paper No. 1985/3)), giving an average age at demolition of 62 years.

14.82 The short time span for which data are available and the relatively small number of buildings demolished over that period do not permit any significant conclusions to be drawn as to whether building lives have been increasing or decreasing over time. It can be argued, a priori, that as a result of economic and population growth the use of core infrastructure becomes more intensive (i.e. the flow of services from that infrastructure increases) and that, all things being equal, the life span of those facilities would be reduced. However, in the absence of clear empirical evidence to support that proposition, the asset lives used by Walters and Dippelsman have been retained.

Private corporations

14.83 Taxation lives are considered too short, and lacking in discrimination between different industries and types of buildings. Unpublished data used in compiling *Building Activity, Australia* (cat. no. 8752.0) were obtained showing separately new work and alterations and additions for different types of buildings. Alterations and additions are assumed to have an average asset life about half that of new work in that they can occur at most stages in the life of the primary building. Information on types of other construction for the private sector is obtained from *Engineering Construction Activity, Australia* (cat. no. 8762.0). Estimates are finalised on a subjective basis, taking into account lives used in other OECD countries, accounting estimates, and estimated proportions of new buildings, alterations and additions and non-building construction.

Public corporations

14.84 For public corporations, separate investigations are undertaken for electricity, gas and water; transport and storage; communication; accommodation, cafes and restaurants, cultural and recreational services; and personal and other services. Mean lives for public corporations are also reported separately in the table below. Together, these industries account for around 90 per cent of public corporations GFCF. For other industries, the estimates of private sector asset lives are used.

General government

14.85 Non-dwelling construction consists mostly of offices, schools, hospitals and roads. The average life of total non-dwelling construction is estimated to be 54 years, with new government buildings assumed to have the same average life as private commercial buildings of 65 years. As with private commercial buildings, the evidence as to whether the average lives of buildings are changing over time is inconclusive, and lives are assumed to remain constant over time. For non-dwelling construction on roads the mean asset lives used by

Walters and Dippelsman (Australian Bureau of Statistics *Estimates of Depreciation and Capital Stock, Australia* (Occasional Paper No. 1985/3)) have been retained.

*Dwellings*

14.86 The estimates used by Walters and Dippelsman (Australian Bureau of Statistics *Estimates of Depreciation and Capital Stock, Australia* (Occasional Paper No. 1985/3)) have been retained, as no more recent information is available. For each type of dwelling, it is assumed that there has been no change in mean asset life over time. However, the composition of dwellings by type of structure has been changing over time.

*Ownership transfer costs*

14.87 The treatment for ownership transfer costs in the PIM is unique. The cost of ownership transfer is written off over the period during which the acquirer expects to hold the asset. If the expectation is met, the costs of ownership transfers will be entirely depreciated when the asset is resold.

14.88 The table below outlines the mean asset lives (years) for non-dwelling construction, dwellings and ownership transfer costs by industry and institutional sector.

Table 14.3 MEAN ASSET LIVES (YEARS) —Non-dwelling construction, dwellings and ownership transfer costs by industry and institutional sector

| | Financial and non-financial corporations | Public non-financial corporations and general government |
|---|---|---|
| NON-DWELLING CONSTRUCTION | | |
| Agriculture, forestry and fishing | 41 | 41 |
| Mining | 29 | 29 |
| Manufacturing | 38 | 38 |
| Electricity, gas, water & waste services | 55 | n.a. |
| Electricity and gas | n.a. | 37 |
| Water and waste services | n.a. | 71 |
| Construction | 44 | 44 |
| Wholesale trade | 50 | 38 |
| Retail trade | 50 | 38 |
| Transport, postal & warehousing | 40 | n.a. |
| Urban transport | 51 | 51 |
| Rail transport | 67 | 67 |
| Sea transport | 47 | 47 |
| Air transport | 30 | 30 |
| Other transport, postal & storage services | 49 | 49 |
| Information, media, & telecommunications | 40 | 49 |
| Accommodation & food services | 50 | 41 |
| Financial & insurance services | 58 | n.a. |
| Rental hiring & real estate services | 57 | 57 |
| Professional, scientific and technical services | 57 | 57 |
| Administration & support services | 57 | 57 |
| Public administration & safety | n.a. | 54 |
| General government roads | n.a. | 33 |
| Education & training | 50 | 50 |
| Health and social assistance services | 50 | 50 |
| Arts and recreational services | 50 | 50 |
| Other services | 50 | 50 |
| DWELLINGS | | |
| Private brick homes | 88 | n.a. |
| Private timber, fibro and other houses | 58 | n.a. |
| Private non-house dwellings (units, flats, etc) | 58 | n.a. |
| Private alterations and additions | 39 | n.a. |
| Public | n.a. | 58 |

| | | |
|---|---|---|
| OWNERSHIP TRANSFER COSTS | | |
| Dwellings | 0 | n.a. |
| Non-dwelling construction | 0 | n.a. |

*Cultivated biological resources*

Livestock

14.89 Information about mean asset lives of breeding and dairy cattle, and wool producing sheep, were obtained from several industry bodies (Bureau of Rural Sciences, Woolmark Company, Dairy Farmers Corporation, and Meat and Livestock Association). Asset lives used are: breeding cattle stock - mean 7 years; dairy cattle - mean 10 years; and sheep for wool - mean 6 years.

Orchard growth.

14.90 There are three components of capital estimates, namely, orchard fruit and nut trees, plantation fruit bearing plants, and grapevines. These have different asset lives due to the types of plants.

14.91 The table below outlines the mean asset lives (years) for cultivated biological resources.

Table 14.4 MEAN ASSET LIVES (YEARS) —Cultivated biological resources

| | Mean life (years) |
|---|---|
| Livestock | |
| Sheep (wool) | 6 |
| Dairy | 10 |
| Orchards | 30 |
| Plantations | 7 |
| Grapevines | 40 |

*Intellectual property products*

Research & development

14.92 The value of R&D capital depreciates over time as new innovations emerge. As this occurs, earlier R&D becomes less effective in the production process and contributes less to profitability. Because of the intangible nature of the asset, the decline in value is difficult to measure and most studies use a range of assumptions based on econometric studies or the observed retirement rates for patents. The Australian Industry Commission report on Research and Development, 1995, cites work by Mansfield (1973) and Pakes and Shankerman (1978, 1984) which suggests that industrial knowledge depreciates faster than physical capital with little left after 10 years. More recent studies (Caballero and Jaffe, 1993) have suggested that the rate of technological change, and consequently the rate of obsolescence, has increased in recent years. However, data on patent expiry rates suggest considerably longer asset lives.

14.93 Data compiled by Intellectual Property Australia show that the mean life-spans of standard patents filed in Australia between 1980 and 2001 were between 10 and 13 years. The data are categorised by 'technology group', whereas R&D expenditure data are categorised by industry (to sub-division level). There is no simple correspondence between the technology group classification and the industry classification, however, there are relatively small differences between the mean patent lives for different technology groups. Given the difficulties in producing estimates for individual industries, and the fact that the estimates (based on the patent data) do not differ greatly, a single asset life distribution is used for all R&D in the ASNA. A mean asset life of 11.0 years has been derived from a weighted average of the patent lives of the different technology groups.

14.94 Patent lives do not necessarily represent the lives of all R&D products and, in principle, an adjustment should be made to account for the fact that not all R&D is patented. Although it seems reasonable to expect that non-patented R&D would on average have shorter lives and depreciate faster than patented R&D,

empirical estimates based on econometric studies vary greatly (with some of the evidence suggesting a longer life than that estimated from patents). In the United States in 2007, the Bureau of Economic Analysis (BEA) tested four scenarios, with the first scenario based on a 15 per cent annual depreciation rate. The other scenarios were based on more rapid rates of technological change, and consequently more rapid rates of obsolescence. The assumption of shorter economic lives gives greater weight to more recent innovations in the capital stock estimates.

14.95 A mean asset life of 11.0 years is broadly consistent with international results. A recent draft OECD Handbook (*Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development*, OECD, 2008) states that the different approaches to estimating R&D asset lives "generally indicate that service lives lie between 10 and 20 years". However, most countries have not committed to an estimate and/or method to be used in their national accounts (the US figures have been used in the BEA's R&D Satellite Account). None of the OECD countries use an asset life significantly shorter than 10 years. For many countries only a depreciation rate is specified, but under a standard double declining balance assumption (that is double that of a straight line depreciation) they imply similar (or sometimes longer) lives. Given the lack of evidence to the contrary, the ABS has assumed a mean asset life of 11.0 years based on patents data.

Computer software

14.96 It is important to distinguish between the different types of software because they are known to have different asset lives, partly due to the different lives of mainframe and personal computers. The software 'mix' has also been changing over time, in favour of PC-based software.

1. *In-house and customised software* - information has been obtained from academic papers and Gartner research, although empirical evidence is quite weak. For years up to 1988-89, a mean life of 8 years (maximum 12 years) has been chosen. From 1989-90, the greater incidence of outsourcing software development, combined with increased technological change, is believed to result in shorter lives, and so a mean life of 6 years (maximum 8 years) has been used.

2. *Purchased (packaged) software* - for years up to 1988-89, a mean life of 6 years has been chosen. From 1989-90, average and maximum lives fall by two years to reflect the impact of greater technological change. Thus average lives fall from 6 years to 4 years in 1989-90.

Entertainment, literary or artistic originals

14.97 *Music* – general information about the life cycle of typical Australian music titles is obtained from the Australian Record Industry Association (ARIA). Indications point to an average life of two years and a maximum life of five years. However, detailed information is not obtained from ARIA's membership to verify the accuracy of these indications.

14.98 *Film and TV* – it is difficult to attribute an asset life to film as little is known about the percentage of films that continue to generate revenue for periods greater than one year, two years etc. However, information from the Australian Film Commission, and from Martin Dale's book *The Movie Game - the film business in Britain, Europe and America*, indicated that an average life of 3.3 years and a maximum life of 6 years would be appropriate (the number of films that earned much money after their sixth year is very small).

14.99 *Literary* – information is obtained from the Australian Publishers Association's (APA) booklet *Introduction to Book Publishing*, and from enquiries to large publishers. APA recognises that books have a very short life. An average life of 1.4 years and maximum life of about 5 years was proposed, and there were no objections to this estimate in discussions with experts from the APA and other large publishers. However, the increasing availability of new print technology such as 'print on demand' could redistribute the author's income, and therefore the life of book titles, over a longer period in the future.

Mineral exploration

14.100 Asset lives for mineral exploration are assumed to coincide with mine and oilfield lives. These are derived indirectly using economic demonstrated resources (EDR) from the balance sheets. First, average annual production for each commodity is divided into its EDR to derive the asset life for each commodity. Using exploration expenditure proportions for each commodity as weights, the average lives for the commodities are aggregated to an average mine life for all commodities. The average mine life used for mineral exploration is 34 years.

14.101 Mine lives for some commodities, namely black coal, iron ore and uranium, have extremely long asset lives, and are excluded from the calculation to avoid distorting the average life. These items had a much greater proportion of total exploration expenditure in early years, but their inclusion would lead to an unjustifiably strong decline in the overall average life of mineral exploration over time.

14.102 The table below outlines the mean asset lives (years) for intellectual property products.

Table 14.5 MEAN ASSET LIVES (YEARS) —Intellectual property products

| | Mean life (years) |
|---|---|
| Computer software | |
| In-house & customised (a) | 6 |
| Purchased (b) | 4 |
| Artistic originals | |
| Film & TV | 3 |
| Music | 1.7 |
| Literary | 1.7 |
| Exploration | 34 |
| Research & Development | 11 |

(a) Prior to 1989-90, the mean life is 8 years
(b) Prior to 1989-90, the mean life is 6 years

Asset life distributions

14.103 The PIM is applied at a relatively high level of aggregation, with each component of GFCF consisting of a large variety of individual assets, each with its own life span. Even within particular types of assets, variations in lives will occur because of differences in the rate of use, maintenance etc. Because of the lack of recent empirical evidence, asset life distribution curves developed by Winfrey[34] in 1938 are used. The Winfrey S3 is a bell-shaped symmetric curve, with approximately three quarters of assets retiring within 30 per cent of the mean asset life. It is empirically based, related to variations in lives of particular types of assets, and is consistent with the general presumption that the expected life for a particular asset will follow an approximately normal distribution.

14.104 Exceptions to the use of Winfrey S3 are made for alterations and additions and for some intellectual property products. In the case of alterations and additions, the flat symmetrical Winfrey S0 is used, reflecting the belief that lives for these assets are likely to be widely dispersed rather than being clustered about the mean.

14.105 In the case of intellectual property products, several approaches have been taken, as described by the following :

- *Computer software* – consideration was given to the high level of technological change in computer software, due to factors such as the release of new generation operating systems and applications, and the availability of more powerful computer equipment and networking capability, the latter introducing some correlation between the lives of computer software and hardware. Accordingly, right skewed retirement distributions have been constructed separately for purchased and for in-house and customised software. For both categories, new retirement functions were introduced in 1989-90 to reflect some decline in software's mean life and maximum life.

- *Artistic originals* – retirement distributions reflect the distribution of the number of years for which artistic originals yield an income or royalty. Information obtained from peak industry bodies implies that retirement distributions are heavily skewed to the left because the vast majority of artistic originals receive an income over a relatively short period (often one or two years). However, a small percentage receive an income over a much longer period, and represent the majority of income received.

[34] Winfrey R., *Statistical Analysis of Industrial Property Retirements*, Iowa State College of Agricultural and Mechanic Arts, 1938.

- *Music* – information about the proportion of music originals that still provide a return to the artist is obtained from ARIA. It suggests that 70 per cent of music originals provide a return in the first two years, with the remaining 30 per cent providing a return fairly evenly over the following three years.

- *Film and TV* – information is obtained from Martin Dale's book *The Movie Game - the film business in Britain, Europe and America*, which examines the life cycle of a typical film. Dale's book describes how a film is sold across a series of different media, each with a different price and a separate time window. His research suggests that the survival of a film depends on its level of financial success. According to his studies, for instance, a quarter of the revenue comes from films which last two years or less and do not make it past the cinema, 30 per cent of revenue comes from films that make it into world video, and the remaining 45 per cent of revenue is attributed to films making it onto television in the fourth, fifth and sixth year. It is mainly the characteristics of financially successful films that will be represented in the asset lives. The vast majority of films, which fail to return a profit, have little impact on the asset life. Weighting films according to their revenue stream avoids the problem of retiring films quickly in accordance with the 'average film', and therefore depreciating films too quickly.

- *Literary* – information obtained from the Australian Publishers Association suggests that 75 per cent of literary originals are retired in the first year and 90 per cent in the first two years.

- *Mineral exploration* – a Winfrey S3 function is used.

- *Research and development* – a Winfrey S3 function is used.

### Sources and methods – Quarterly

14.106 The PIM measures COFC annually due to its parameters. Linear interpolation and extrapolation are used to estimate quarterly COFC.

ACQUISITIONS LESS DISPOSALS OF NON-PRODUCED NON-FINANCIAL ASSETS

## Introduction

14.107 Acquisitions less disposals of non-produced non-financial assets cover three distinct types of non-produced non-financial assets: natural resources, contracts; leases and licences; and goodwill and marketing assets. At present, estimates of the value of purchased goodwill and marketing assets are not compiled for the ASNA.

14.108 Natural resources include the purchases less sales of land, subsoil assets, non-cultivated biological resources, water resources and radio spectra. Land is defined to include the soil covering and associated surface water over which ownership rights can be enforced and from which economic benefits can be derived by their owners. Subsoil assets consist of known deposits of coal, oil, gas or other fuels and metallic ores, and non-metallic minerals, etc., that are located below or on the earth's surface, including deposits under the sea. Non-cultivated biological resources consist of animals, birds, fish and plants that yield both once-only and repeat products over which ownership rights are enforced but for which natural growth or regeneration is not under the direct control, responsibility and management of institutional units. Water resources are not included in the ASNA given the data limitations. 2008 SNA states that radio spectra should also be included in natural resources.

14.109 In principle, where transactions in residential and non-residential buildings occur, the land component should be reported separately from the building component. However, in practice, the total sales value is recorded as GFCF. The value of transfer costs involved in the transaction (such as stamp duties, agents' commissions and lawyers' fees) is included in GFCF.

14.110 Contracts, leases and licences includes marketable operating leases, permits to use natural resources, permits to undertake specific activities and entitlement to future goods and services on an exclusive basis. The ASNA includes permits to use natural resources only and the item included is spectrum licences.

14.111 Due of the lack of data, estimates for the purchase of natural resources, and contracts, leases and licences (net) in the ASNA represent only those transactions identified in the accounts of non-residents, general government and public corporations. The net purchases of natural resources, and contracts, leases and licences by non-residents, general government units and public corporations are assumed to equal the net amount of such sales by private corporations, and no entry is shown for households.

## Sources and methods – Annual

14.112 The table below outlines the data sources and methods used in the estimation of annual acquisitions less disposals of non-produced non-financial assets by sector in current prices only. Volume estimates are not calculated for acquisitions less disposals of non-produced non-financial assets.

Table 14.6 ANNUAL ACQUISITIONS LESS DISPOSALS OF NON-PRODUCED NON-FINANCIAL ASSETS—By sector

| Item | Comment |
|---|---|
| **Non-residents** | Estimates are obtained from Balance of Payments data. |
| **General government** | Estimates for public authorities are obtained from the annual Government Finance Statistics.<br><br>For Commonwealth, State and Territory governments, data are extracted from administrative sources such as Commonwealth and State Budget Papers, Auditors'-General Reports and Commonwealth Department of Finance and Deregulation ledgers.<br><br>For local government, a joint ABS/Commonwealth Grants Commission annual return is collected from each local government authority. |
| **Public non-financial corporations** | Estimates for public non-financial corporations are based on annual financial statements and Auditors'-General Reports.<br><br>Estimates for public financial corporations are compiled from data |

| | |
|---|---|
| | collected by the ABS in the annual Economic Activity Survey. |
| **Private non-financial corporations** | Derived as the difference between the total acquisitions less disposals of non-produced non-financial assets for non-residents and general government and public non-financial corporations. |
| **Financial corporations and households** | Not compiled due to the lack of data available. |

Sources and methods – Quarterly

14.113 Quarterly estimates for the acquisitions less disposals of non-produced non-financial assets are published at the national level and in the external account in the ABS publication *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0). The sector dimension is published in the ABS publication *Financial Accounts* (cat. no. 5232.0)

14.114 The table below outlines the data sources and methods used in the estimation of quarterly acquisitions less disposals of non-produced non-financial assets by sector in current prices only. Volume estimates are not calculated for acquisitions less disposals of non-produced non-financial assets.

Table 14.7 QUARTERLY ACQUISITIONS LESS DISPOSALS OF NON-PRODUCED NON-FINANCIAL ASSETS—By sector

| Item | Comment |
|---|---|
| **Non-residents** | An estimate of acquisitions less disposals of non-produced non-financial assets by non-residents is obtained directly from Balance of Payments statistics. The data included is for leases and the radio spectrum only. |
| **General government** | Estimates for public authorities are obtained from the quarterly Government Finance Statistics. |
| **Public corporations** | Estimates for public authorities are obtained from the quarterly Government Finance Statistics. |
| **Private non-financial corporations** | Derived as the difference between the total acquisitions less disposals of non-produced non-financial assets for non-residents and general government and public non-financial corporations. |
| **Financial corporations and households** | Not compiled due to the lack of data available. |

CAPITAL TRANSFERS

## Introduction

14.115 A transfer is defined as a transaction in which one institutional unit provides a good, service or asset to another unit without receiving in return from the latter any counterpart in the form of a good, service or asset. Transfers may be made in cash or in kind and can be divided into current or capital transfers. A capital transfer is one in which:

1. ownership of an asset (other than cash or inventories) is transferred from one institutional unit to another (i.e. a capital transfer in kind);
2. cash is transferred to enable the recipient to acquire another asset; or
3. the funds realised by the disposal of an asset are transferred.

14.116 The first category of capital transfers includes cancellation of liabilities by mutual agreement between creditor and debtor, sometimes known as 'debt forgiveness'. However, writing off debt is not a transaction between institutional units and therefore does not appear in either the capital or financial accounts of the ASNA. The repudiation of debt by a debtor is also not a transaction and is not recognised in the ASNA. Ideally, a debt write-off should be recorded in the other changes in the volume of assets account of the creditor and debtor.

14.117 The second category of capital transfers includes grants made by governments or international organisations to other governments, including grants by one level of government to another. Such grants are recognised as capital grants because the recipients, under the terms of the grants, are required to spend the money on capital projects (i.e. acquisition of non-financial assets). It also includes taxes that are deemed to be capital taxes, which are taxes, such as inheritance and gift taxes, that are non-recurrent and required to be paid only when a specific event (such as the death of the taxpayer) occurs. Capital taxes do not include taxes on sales of assets (e.g. capital gains taxes) as these are not taxes on transfers.

14.118 In the ASNA, examples of capital transfers from the private sector to the public sector include contributions to local government by real estate developers towards the cost of the construction of roads etc. on their subdivisions; contributions by coal companies towards the cost of construction of railway lines; and contributions by businesses and persons towards the cost of erecting power lines on private property.

14.119 Examples of capital transfers from the general government sector to other sectors (i.e. capital grants) include building and equipment grants made by general government to research laboratories, private schools, and university residential colleges, as well as assistance to first home buyers. Capital grants from the Commonwealth government to State and local governments consist of the following:

- general purpose capital grants (untied payments to assist with State and Territory outlays for capital purposes);
- specific purpose grants, which are payments to the States and Territories to meet capital expenditure, the purpose of which is designated by the Commonwealth, and/or which are conditional on States agreeing to undertake particular actions. Some of these grants are passed on by State and Territory governments to local government authorities. Examples of specific purpose grants for capital purposes include grants to the States and Territories for universities and technical colleges, government and non-government schools, teaching hospitals, public housing and roads; and
- direct capital grants to local government authorities.

14.120 The only capital taxes in Australia are inheritance and gift taxes. In the late 1970s, their value started to decline considerably and they have been insignificant since the mid-1980's.

14.121 Capital transfers to non-residents comprise Commonwealth general government foreign aid in the form of the provision of capital assets. Other transactions, such as debt forgiveness, could also be classified as capital transfers to/from non-residents as described in *Balance of Payments and International Investment Position, Australia: Concepts, Sources and Methods* (cat. no. 5331.0), but to date no such transactions have been identified. When households change their economy of residence, there are changes to the status for the assets they own and liabilities they owe. These changes are recorded as reclassifications through the other changes in volume of assets account.

14.122 Capital transfers also include major payments in compensation for extensive damages or serious injuries not covered by insurance policies. The payments may be awarded by courts of law or settled out of court. Legacies and large gifts from corporations to non-profit institutions to finance GFCF are also included.

## Sources and methods – Annual

14.123 The tables below outline the data sources and methods used in the estimation of annual capital transfers in current prices only. Volume estimates are not calculated for capital transfers.

Table 14.8 ANNUAL CAPITAL TRANSFERS—Capital transfers between resident institutional sectors

| Item | Comment |
|---|---|
| **Capital transfers from general government to other sectors** | Estimates of capital transfers between general government and the other institutional sectors are obtained from the Government Finance Statistics.<br><br>For Commonwealth and State general government, data are extracted from administrative sources such as Commonwealth and State budget papers and Auditors'-General Reports, Commonwealth Department of Finance and Deregulation Ledgers and supplementary departmental documents. |
| **Capital transfers from other sectors to general government** | Estimates of capital transfers between general government and the other institutional sectors are obtained from the Government Finance Statistics.<br><br>For Commonwealth and State general government, data are extracted from administrative sources such as Commonwealth and State budget papers and Auditors'-General Reports, Commonwealth Department of Finance and Deregulation Ledgers and supplementary departmental documents. The data obtained is in relation to inheritance and gift duties and this amount is insignificant now. |

Table 14.9 ANNUAL CAPITAL TRANSFERS—Capital transfers to and from non-residents

| Item | Comment |
|---|---|
| **Capital transfers to non-residents** | Capital transfers to non-residents are obtained directly from the Balance of Payments.<br><br>Commonwealth government foreign aid transfers of a capital nature are identified from the transactions recorded in the Department of Finance and Deregulation ledgers.<br><br>A more detailed description of the sources and methods used to compile these estimates is provided in *Balance of Payments and International Investment Position, Australia: Concepts, Sources and Methods (cat. no. 5331.0).* |
| **Capital transfers from non-residents** | This is not applicable for Australia. |

## Sources and methods – Quarterly

14.124 The tables below outline the data sources and methods used in the estimation of quarterly capital transfers in current prices only. Volume estimates are not calculated for capital transfers.

14.125 No quarterly estimates are compiled for Capital transfers between resident institutional sectors.

Table 14.10 QUARTERLY CAPITAL TRANSFERS—Capital transfers to and from non-residents

| Item | Comment |
|---|---|
| **Capital transfers to non-residents** | Capital transfers to non-residents are obtained directly from the balance of payments.<br><br>Commonwealth government foreign aid transfers of a capital nature are identified from the transactions recorded in the Department of Finance and Deregulation ledgers.<br><br>A more detailed description of the sources and methods used to compile these estimates is provided in *Balance of Payments and International Investment Position, Australia: Concepts, Sources and Methods (cat. no. 5331.0).* |
| **Capital transfers from non-residents** | This is not applicable for Australia. |

# CHAPTER 15 THE FINANCIAL ACCOUNTS

## THE FINANCIAL ACCOUNTS

### The financial account

15.1 This chapter describes the concepts, sources and methods of the financial accounts, and the financial asset/liability components of the balance sheets. To obtain an understanding of ASNA compilation methodology, it is necessary to present both the financial transactions and balance sheets in a single chapter. The compilation of the financial accounts is mainly based on balance sheet information obtained from administrative data and surveys of financial and other institutions. Some transactions and other flows involving financial assets and liabilities are estimated by 'differencing', which involves subtracting opening balance sheet values from closing balance sheet values, and using other information to distinguish transactions from non-transaction flows, such as write-offs and holding gains and losses.

15.2 The financial accounts record information about transactions in financial assets and liabilities between resident institutional units and between resident institutional units and the rest of the world. The balance sheets provide information about the values of stocks of financial assets and liabilities at particular points in time. Financial accounts statistics are sometimes referred to as 'flow-of-funds' statistics and it is the final account in the full sequence of accounts that records transactions between institutional units.

15.3 Financial assets and liabilities positions record the values of stocks of financial assets and liabilities. Changes adjusted for valuation and other flows in financial assets positions are recorded under the heading *net acquisition of financial assets*, which refers to acquisitions less disposal of financial assets. Changes adjusted for valuation and other flows to liabilities positions are recorded under the heading *net incurrence of liabilities*, which refers to incurrence of liabilities less repayments. Each of these major categories can be broken down according to the financial instruments used and the institutional sector and subsectors of counterparties.

15.4 Net lending/borrowing is the balancing item in the capital account. Net lending is the excess of capital finance for capital acquisition, while net borrowing is the existence of a borrowing requirement to finance capital acquisition. The financial account explains how net lending/borrowing is effected by means of changes in the holding of financial assets and liabilities. The sum of these changes (net change in financial position) is conceptually equal in magnitude to the net lending/ borrowing item of the capital account. However, in the ASNA, the use of differing data sources for the two accounts can give rise to significant differences between the two balancing items. These differences are recorded in an item for net errors and omissions for each institutional sector.

15.5 Financial accounts are compiled for each institutional sector and indicate how institutional units engage in financial transactions with each other; the surplus resources of one sector can be made available by the units concerned for use by other sectors. The financial account shows how deficit, or net borrowing, sectors obtain the necessary financial resources by incurring liabilities or reducing assets and how the net lending sectors allocate their surpluses by acquiring financial assets or reducing liabilities. The account also shows the relative contributions of various instruments of financial assets and liabilities to these transactions.

15.6 The ASNA compile financial accounts for each sector and for a wide range of subsectors. In these financial accounts, the transactions relate to financial assets and liabilities with other counterparty sectors and subsectors.

15.7 In the National financial account, transactions in financial assets and liabilities with non-residents are shown. The National financial account is identical to the Financial account in the balance of payments but presented from the rest of the world point of view.

**NATIONAL FINANCIAL ACCOUNT**

| **FINANCIAL ASSETS** | **LIABILITIES AND NET WORTH** |
|---|---|
| Net acquisition of financial assets by the rest of the world | Net incurrence of liabilities by the rest of the world |
| | Net errors and omissions |
| | Net lending |
| **Changes in financial assets** | **Changes in liabilities and net worth** |

15.8 The quarterly *Australian National Accounts: Financial Accounts* (cat. no. 5232.0) contains the following:

- sectoral and subsectoral financial accounts and balance sheets by financial instruments. From the balance sheet and transaction information it is possible to derive a total of revaluation and other changes in volume estimates;
- twelve financial instrument market tables by 19 sectors and subsectors issuing/ accepting/ borrowing by counterparties; the presentation is described as within a from-whom-to-whom framework. For these tables, transactions and positions within sectors and subsectors are presented for e.g. bank deposits held by other banks; and
- presentation of sectoral capital and financial accounts (referred to as flow of funds matrices) with a sectoral net error and omissions item reflecting the difference between sectoral net change in financial position and net lending and borrowing in the capital accounts.

15.9 The flow of funds matrices published are not what is defined in 2008 SNA because:

- they include the capital account in its presentation; and
- the financial accounts presented are not in the required from-whom-to-whom style, as described in 2008 SNA (paragraph 2.150):
  "*It shows which sectors and subsectors incur loans and make deposits, it does not allow an in-depth examination of the intermediation process whereby a financial institution draws in funds, repackages them and issues them as other instruments to other units. In order to explore this, a three-dimensional "from-whom-to-whom" style of presentation is needed. This is referred to as a flow of funds matrix. The three-dimensional table of financial transactions is usually presented as a series of matrices, one matrix for each kind of financial instrument showing the flows from one sector to another."*

15.10 The financial instrument market tables are produced in a from-whom-to-whom framework, so ASNA could produce the flow of funds matrix as described above in 2008 SNA. Similar matrices (financial stocks) are used as the foundation to construct interest and dividend matrices to produce interest and dividend flows in the ASNA .

## Financial assets and liabilities

15.11 Financial assets, for the most part, represent a contractual claim on another institutional unit (resident or non-resident) and entitle the holder to receive an agreed sum at an agreed date, with the exception being shares. Shares are treated as financial assets even though the financial claim their holders have on the corporation is not a fixed or predetermined monetary amount. Liabilities are the counterparts of financial assets and there are no non-financial liabilities recognised in the 2008 SNA, thus the term 'liability' necessarily refers to a liability that is financial in nature.

15.12 The acquisition of a financial asset by an institutional unit involves a counterpart liability on the part of another institutional unit. Monetary gold is treated as a financial asset even though the holders do not have a claim on other designated units (refer to paragraphs 15.50 and 15.51). Because of the symmetry of financial claims and liabilities, the same classification is used to portray both assets and liabilities in the financial accounts and balance sheets. The ASNA adopts the 2008 SNA term "instrument" to relate to the asset or liability aspect of an item in the financial account and balance sheet.

15.13 The ASNA financial instrument classification follows that recommended in 2008 SNA with some adaptation to suit the Australian financial environment and ASNA compilation practices:

- where additional classification points are employed to provide more detail for debt securities to show "domicility" of securities (issued in Australia or issued offshore);

- to discriminate short-term securities between bills of exchange (three name paper) and other securities (one name paper);
- where the 2008 SNA instrument classification embeds counterparty sector information which ABS believes more properly belongs to the sector classification, for example inter-bank positions and investment funds shares and units; and
- because of lack of data or workload considerations, for example there is no discrimination between shares and other equity.

15.14 The ASNA financial assets and liabilities are classified according to financial instruments as follows :

- monetary gold and SDRs;
- currency;
- transferable deposits and other deposits;
- short-term securities;
- long-term securities;
- short-term loans;
- long-term loans;
- derivatives;
- shares and other equity;
- insurance technical reserves;
- trade credits and advances and other accounts receivable and payable.

15.15 The system also includes a sector and subsector classification of financial assets and liabilities, which categorises financial claims according to the sectors and subsectors of counterparties. Counterparties are the institutional units on which claims are held by creditors, and the institutional units holding claims against debtors.

15.16 Financial assets and liabilities attributable to foreign direct investment are not recorded separately within financial instrument categories.

15.17 Financial claims can be distinguished by whether they are negotiable or not. A claim is negotiable if its legal ownership is readily capable of being transferred from one unit to another unit by delivery or endorsement. While any financial instrument can potentially be traded, negotiable instruments are designed to be traded on organised markets (such as the stock exchange) and other informal markets (often referred to as over-the-counter markets). Negotiability is a matter of the legal form of the instrument. Those financial claims that are negotiable are referred to as securities and include shares and debt securities.

## VALUATION OF TRANSACTIONS AND STOCKS OF FINANCIAL ASSETS AND LIABILITIES

### Transactions

15.18 In the financial accounts, transactions are recorded at the value actually exchanged, i.e. market value. Exchange of value implies a change of ownership of an asset, and this is a central principle in classifying a change in value to either a transaction or other economic flow. Examples of changes of ownership include purchase/sale of shares, issue/take up of debt securities, deposit of cash in a bank, and provision of funds in exchange for a mortgage for a housing loan. In the case of the financial accounts these transactions take place in formally organised financial markets (such as the stock exchange) or in informally organised markets (often referred to as over-the-counter markets), such as the market for bank deposits.

15.19 The market value may differ from the contractual value of claims arising from the transaction, for example the sale value of shares compared to the par value of the shares, or the proceeds value of a debt security issue rather than the nominal value of the debt securities.

15.20 Transaction values are recorded without deducting transaction costs such as brokerage fees or commissions. This ensures that debtors and creditors record the same amount for the financial instrument. Such fees or commissions are treated as sales of services, which are current account transactions rather than financial account transactions. The valuation of financial instruments, which excludes commission charges, differs from the valuation of non-financial assets, which includes any cost of ownership transfer.

15.21 The payments required under a contract relating to financial assets and liabilities almost always represent more than one transaction in the sense used in the 2008 SNA. Payments of interest on loans and deposits, as specified by financial institutions, involve both interest and a service fee, which is the service payment to the financial institution for making the loan available or safeguarding the deposit. Similarly, for some financial instruments, e.g. bonds, the increase in value over time is taken to represent interest, not simply a price increase in the value of the asset. Therefore the value of the transactions in financial instruments recorded in the financial account excludes these service charges and interest payments.

15.22 The exchange of value is recorded on an accrual basis, i.e. in the period when ownership changes, which may be different to when cash relating to the transaction is paid or falls due for payment. For example, an enforceable contract for the purchase/sale of shares comes into existence when a deal is struck on the stock exchange. This has to be settled two days later, and the settlement date may be in a different quarter to when the deal was made. This gives rise to a further financial claim in the form of an account payable/receivable to bridge the settlement period.

15.23 Exchanges of financial assets are requited in the sense that the provision of a resource (say cash) is exchanged for an obligation or claim (share, deposit account balance, debt security or mortgage documentation). These claims are legally enforceable according to general commercial law or specific agreements between the parties. In some cases the legal nature of the transaction and the economic effect of the transaction may be different. The 2008 SNA makes a small number of exceptions to the legal change of ownership principle to an economic change of ownership basis. For the financial accounts the major exception is financial leasing, where the legalities of the transaction are modified such that the leased asset is deemed to have been sold to the lessee in exchange for a loan, the financial lease. Commercial accounting standards also treat financial leasing in this manner.

15.24 Transactions for any particular class of transactor are recorded on a net basis in the financial accounts. For example, bank deposit transactions are the net of new deposits less withdrawals, transactions in shares are the net of purchases and sales. For some economic analysis the components of net transactions are of interest, and there are some limited data on gross transactions available on request, such as new share issues.

### Stocks, revaluation and other changes in volumes

15.25 Stocks of financial assets and liabilities are valued using prices that are current on the date to which the balance sheet relates and that refer to specific assets. These prices should be observable prices on markets whenever such prices are available. In practice there are some cases where the prices of analogous assets are used to estimate prices for assets where there are no observable prices.

15.26 A key principle for 2008 SNA, as outlined above, is to record financial transactions and stock at market valuation. A consequence of this is the role that the Revaluations account has in reconciling price changes in financial assets and liabilities during a period with stock values at the end of each period.

15.27 Revaluations occur when the price of financial assets and/or liabilities changes causing an increase or decrease in the stock value. Revaluations are an economic flow that does not result from a change of ownership. Examples of the causes of revaluation are share price changes and the impact of exchange rate changes on assets denominated in foreign currency. While revaluations are not transactions, they do have a significant impact on stock values from period to period and may have a significant impact on economic behaviour. For example, the run-down in valuation of superannuation assets in response to a fall in the price of shares may result in employees deferring retirement.

15.28 Values of stocks of financial assets and liabilities may change over time through causes other than transactions and price changes these are classified as other changes in volumes (OCV). For financial assets and liabilities the most significant OCV result from phenomena such as bad debt write-offs or corporate failures. In such cases it is often difficult to distinguish between price changes (debt write down, share price fall) and OCV. In practice the ASNA combines the known OCV with revaluations to account for non-transaction changes in stock value for financial assets and liabilities.

15.29 OCVs also record statistical artefacts (e.g. sectoral classification changes that might occur through privatisation of a previously public sector owned corporation, or a building society that becomes a bank). Although the change in classification may be the result of transactions (such as share sales), treating the reclassification of all the assets and liabilities represented by the share value as transactions is not a satisfactory explanation of what has occurred. Another statistical artifact arises in discontinuities in time series that arise because of the workloads involved in maintaining consistency over the full period of long time series. At some point in the time series the inconsistency in treatment between opening and closing stocks will be allocated to OCV rather than being allowed to contaminate the transaction series.

15.30 For more information on revaluation and other changes in volumes see Chapter 16.

## INSTITUTIONAL SECTORS AND SUBSECTORS IN THE FINANCIAL ACCOUNTS

15.31 The institutional sector classification used in the financial accounts and balance sheets is the same as that used in the rest of the ASNA and the SESCA:

- non-financial corporations;
- financial corporations;
- general government;
- households (including non-profit institutions serving households); and
- rest of the world.

15.32 In the financial accounts and balance sheets, the non-financial corporations, financial corporations and general government sectors are broken down into subsectors, as shown below:

- Non-financial corporations
  - Private
    - Non-financial investment funds
    - Other private non-financial corporations
  - Public
    - National
    - State and local
- Financial corporations
  - Central bank
  - Banks
  - Other depository corporations
  - Pension funds
  - Life insurance corporations
  - Non-life insurance corporations
  - Money market financial investment funds
  - Non-money market financial investment funds
  - Central borrowing authorities
  - Securitisers
  - Other financial corporations
- General government
  - National
  - State and local.

15.33 The institutional sector and subsector classification shown above is also used to classify the counterparty transactions and positions shown for each institutional sector and subsectors. Chapter 4 provides a description of the sectors and subsectors used in the financial accounts.

15.34 As financial transactions and other flows take place between institutional units, and financial positions are held between institutional units, the transactions, flows and positions are classified to the sectoral classification twice, once from the asset holder's point of view and the other from the liability issuer's point of view. For example, household deposits with banks are classified to household sector assets and bank sector liabilities as a party/counterparty pair. The double classification is applied symmetrically for parties and counterparties to flows or positions.

15.35 In the formal sectoral presentation of the financial accounts all transactions and positions between entities in the same subsector or each successive aggregation of subsectors is eliminated. Consider a bank that incurs a deposit liability and in turn places the funds on deposit with another, but unrelated, bank. The question of "what is the value of bank sector deposits" is most properly answered from a sectoral behaviour point of view by consolidation (elimination) of the intra-bank sector deposit. One consequence of this type of consolidation is that aggregation of subsectors to broad sectors, say all subsectors of the financial corporations sector, will produce a lower aggregate value for a particular transaction category than the simple summation of the components. Consolidation of financial accounts for all domestic sectors to a whole of economy aggregate will result in an exact counterpart to the Rest of World accounts.

15.36 For some types of economic analysis the formal sectoral consolidation has some drawbacks. For financial market analysis, say, for determining potential for issuing various instruments, it is useful to know the gross rather than net size of the market. Thus for the financial accounts presentation of financial instrument markets data the entries eliminated in the example given above are retained. The bank deposits markets table will disclose the value of bank deposits with banks.

## OVERVIEW OF SOURCES AND METHODS

### Introduction

15.37 The compilation of the financial accounts and financial balance sheets are mainly based on administrative data collected by the Australian Prudential Regulatory Authority (APRA) under the *Financial Sector (Collection of Data) Act 2001*, and ABS statistical surveys. Of particular importance are the ABS Survey of Financial Information (SFI) and the Survey of International Investment (SII), both of which are conducted quarterly. Other data sources are used to supplement the ABS and APRA sources, such as market capitalisation for different sector and subsector share issuance from the Australian Securities Exchange data, information on Commonwealth Government from ledgers obtained from Government Finance Statistics and bond price indexes from private financial market analysts.

### Data sources for sectors and subsectors

#### Non-financial investment funds

- Balance sheet information from the ABS Survey of Financial Information - Non- Market Investment Funds.
- Supplementary counterparty information from market capitalisation information from the Australian Securities Exchange, and the ABS Survey of International Investment.

#### Other private non-financial corporations

- Balance sheet information for the large corporations from the ABS Survey of Financial Information - Non- Financial Trading Corporations.
- Supplementary counterparty information from market capitalisation information from the Australian Securities Exchange, Banks and ABS Survey of International Investment.

National public non-financial corporations

- Balance sheet information from the ABS Survey of Financial Information - Government and Other Entities.
- Supplementary counterparty information from Banks and ABS Survey of International Investment.

State and Local public non-financial corporations

- Balance sheet information from the ABS Survey of Financial Information - Government and Other Entities.
- Supplementary counterparty information from Central Borrowing Authorities and annual reports of State and Territory Housing Commissions.

Central bank

- Balance sheet information from the ABS Survey of Financial Information - Reserve Bank of Australia.
- Supplementary counterparty information from ABS Survey of International Investment

Banks

- Balance sheet information from suite of domestic books forms under the APRA Monthly Bank Statement of Financial Position.
- Supplementary counterparty information from ABS Survey of International Investment.

Other depository corporations

- Balance sheet information:
  - from suite of forms under the APRA Monthly *R*egistered Financial Corporations Statement of Financial Position (only units with total assets greater than $50 million are required to submit a return to APRA).
  - monthly, Building Societies, and Credit Unions Statement of Financial Position (only units with total assets greater than $50 million are required to submit a return to APRA monthly, smaller units report quarterly).
- Supplementary counterparty information from ABS Survey of International Investment.

Pension funds

- Balance sheet information:
  - from APRA Quarterly Superannuation Statement of Financial Position (only units with total assets greater than $50 million are required to submit a return to APRA monthly, the smaller units report annually).
  - from the Australian Taxation Office (ATO) for the ATO regulated Self-managed superannuation funds. The funds submit an annual return, ATO provide modelled quarterly estimates.
  - from the ABS Survey of Financial Information - Investment Managers, provides balance sheet information about superannuation funds placed with the investment managers.

Life insurance corporations

- Balance sheet information for life insurance corporations and friendly societies from the ABS Survey of Financial Information - Life Insurance Companies and Friendly Societies.
- Supplementary information for total assets from APRA Quarterly Life Insurance Companies Statement of Financial Position.

Non-life insurance corporations

- Balance sheet information:
  - for private general insurers, from APRA Quarterly General Insurance Statement of Financial Position.
  - for public insurers, from the ABS Survey of Financial Information - Government and Other Entities.
  - for health insurers, from the annual Private Health Insurance Administration Council publication *Operations of the Registered Health Benefits Organisations*. Quarterly data are modelled from the annual data.

Money market investment funds

- Balance sheet information from the ABS Survey of Financial Information - Money Market Funds.

Non-money market investment funds

- Balance sheet information from the ABS Survey of Financial Information - Non-Money Market Funds.
- Supplementary counterparty information from market capitalisation information from the Australian Securities Exchange, and ABS Survey of International Investment.

Central Borrowing Authorities

- Balance sheet information from the ABS Survey of Financial Information - Government and Other Entities.
- Supplementary counterparty information from banks and the ABS Survey of International Investment.

Securitisers

- Balance sheet information from the ABS Survey of Financial Information – Securitisers.
- Supplementary counterparty information from the ABS Survey of International Investment.

Other financial corporations

- Balance sheet information:
  - for financial auxiliaries, from the ABS Survey of Financial Information - Investment Managers.
  - for public units, from the ABS Survey of Financial Information - Government and Other Entities.
- Supplementary counterparty information from market capitalisation information from the Australian Securities Exchange, banks, other depository corporations, securitisers , Sydney Futures Exchange and ABS Survey of International Investment.

National general government

- Balance sheet information from:
  - the ABS Survey of Financial Information - Government and Other Entities.
  - Commonwealth government ledgers from Government Finance Statistics.
  - Australian Office of Financial Management.
- Supplementary counterparty information from the Reserve Bank of Australia (RBA), banks other depository corporations and ABS Survey of International Investment.

State and local general government

- Balance sheet information from the ABS Survey of Financial Information - Government and Other Entities.
- Supplementary counterparty information from central borrowing authorities, National general government, banks and other depository corporations.

Households

- Supplementary counterparty information from RBA, banks, other depository corporations, securitisers, National general government and ABS Survey of International Investment.
- Residual allocation of transactions and holdings of securities.
- Allocation of insurance technical reserves from compilation models.

Rest of the World

- Balance sheet information from the ABS Survey of International Investment.
- Supplementary counterparty information from pension funds, life insurance, non-money market investment funds.

## Data issues

### Undercoverage of some sectoral data

15.38 There is no source balance sheet data from small non-financial corporations, solicitors' and similar trust funds, and financial auxiliaries (such as stock brokers), some of which buy securities on their own account.

### "Exposure accounting" or "hedge accounting"

15.39 Certain market practices result in commercial accounting data that are difficult to interpret within a 2008 SNA accounting framework. Difficulties arise from the approach in commercial accounting known as "exposure accounting" or "hedge accounting". Under this approach the emphasis is on the net effect of various contractual obligations on profits and net worth, and the notion is extended by bundling together contracts associated with a particular deal or strategy and recording the net results at that level of detail.

15.40 An example of this practice is accounting for contracts that involve foreign exchange risk (e.g. issue of debt security liabilities denominated in US dollars issued to investors in the USA, bundled with the contracts that hedge that foreign currency risk, for example a US dollar / Australian dollar derivative, negotiated with an Australian bank). The outcome of this bundling is that there is no foreign currency exposure resulting from the combination. The problem that bundling poses for recording in the financial accounts is that it is netting two contracts with different contractual parties that are in different sectors (in this example they are in different countries) where one contract is a liability and the other is in an asset position potentially. The bundled result cannot be sensibly aggregated with any particular asset class or under any sector classification, and hence cannot contribute usefully to economic analysis.

15.41 Another example of bundling of contracts for a net result is the notion of structured finance, where various combinations of debt, equity and derivatives can be bundled to give a tailored outcome, quite often associated with tax effective outcomes. The results can also be represented as "hybrid" or "synthetic" securities. Another practice with similar aims is "stapled securities".

15.42 For the financial accounts the data in respect of structured products, bundled products and contracts reported under exposure methods is to unbundle and classify the components on the basis of the legalities of the situation, not the economic effect. The overall economic effect of such contracts will be reflected in the aggregate balancing items in the national accounts that will reflect accurately the operating surplus, property income flows, financial transactions, revaluations and net worth that result and also provide the basis for how those outcomes evolved.

### Compilation methodology

15.43 Most of the information obtained from the APRA collections and surveys is financial balance sheet information. It is used to estimate sectoral (and subsectoral) transactions and stocks of financial assets and liabilities by financial instrument and counterparty.

- The compilation methodology ensures that the most reliable estimates are used. As the APRA collections and surveys collect information from both parties to a financial transaction, a choice is often possible because the different data sources provide alternative or counterpart measures of the same item. For example, private non-financial corporation loans data collected from banks is used and not the estimates collected for private non-financial corporations from the Survey of Financial Information.
- In many cases, financial transactions are derived by taking the difference between closing and opening levels of balance sheet items and, where possible, eliminating the component of the change caused by valuation effects such as exchange rate movements and changes in financial instrument prices. For example, the opening stock of securities denominated in foreign currencies (which is reported in Australian dollars) is first re-valued using the exchange rates prevailing at the end of the period. The recalculated opening stock is subtracted from the reported closing stock to obtain an estimate of the value of transactions (in Australian dollars). The estimated value of transactions is then subtracted from the difference between the actual reported opening and closing stocks to obtain an estimate of the valuation effect.
- Some transactions are recorded using directly collected data. Most of the estimates of transactions involving non-residents are based on directly collected data from the Survey of International Investment.
- In some cases, it is possible to undertake validation for some estimates. After the initial estimates of stocks and transactions have been prepared, estimates of valuation changes are calculated as a residual. These estimates are then used to test the plausibility of the initial estimates of stocks and transactions and, if necessary, adjustments may be made to these initial estimates.
- The compilation methodology ensures that the best estimates for rest of the world assets and liabilities are used. A data confrontation process between the ABS Survey of Financial Information (SFI), APRA suite of forms, Statement of Financial Position and the Survey of International Investment selects the best estimates. As estimates for some sectors use data from SFI and APRA (e.g. pension funds and life insurance corporations) a balancing process is undertaken to ensure that the major aggregates such as Australia's international investment position and other sub aggregates derived in the ASNA are the same as is published in *Balance of Payments and International Investment Position, Australia*, (cat. no. 5232.0).

## ASNA financial accounts and balance sheets divergence from 2008 SNA

### Creditor and debtor principle to valuing debt securities

15.44 The 2008 SNA recommends that interest on debt securities be recorded in accordance with the "debtor principle". Under this principle, interest payments are the contractual payments evidenced by the "coupon" payable in these contracts. To the extent that coupon interest is not aligned with market yields, the market value of the debt securities will adjust, downwards if coupon is less than market yield and upwards if coupon is greater than market yield. There are some difficulties implementing the debtor principle for securities where the contractual interest is variable through referencing external indicators.

15.45 The alternative to the debtor principle is to use market values and interest yields consistently, which is called the "creditor principle". The creditor principle is conceptually coherent and it also copes with variable interest instruments. If market valuations of debt securities' stocks is undertaken (as recommended by the 2008 SNA) by discounting future cash flows by the prevailing interest rate, then it makes sense to use the same interest rate to value the associated flows, including interest transactions. Using another interest rate (e.g. the rate at the time the debt instrument was issued) to calculate interest transactions would mean that stocks and flows are calculated using different prices. The adjustment in value of debt securities is seen as a financial transaction (new issue if value increases and repayment if value decreases) under this scenario. Sometimes interpretation of creditor principle data conflicts with an interpretation derived from accounting standards, e.g. debt value and interest expenditure can change not through the activity of debt issuers (such as government) but by variations in the market. The ASNA applies the creditor principle in the national accounts as a whole, including the financial accounts.

### Repurchase agreements

15.46 A repurchase agreement (repo) involves the sale of securities or other assets with a commitment to repurchase equivalent assets at a specified date. The buyer may on-sell these securities to another party. The 2008 SNA treats repos as collateralised loans, or as other deposits if repos involve liabilities classified under national measures of broad money. The collateralised loan treatment is not supported by the ABS. The ABS maintains that the best statistical representation of a repo is that of a sale of securities, with the obligation to sell/buy-back similar securities recorded as a forward contract, i.e. a form of derivative. This treatment has the advantage of unduplicated recording of securities assets whereas the collateralised loan approach (2008 SNA) requires recording of negative security assets to maintain equality between total securities' asset holdings and total securities' liabilities on issue. The ASNA treatment will impact on compositional aspects (e.g. securities versus loans, classification of asset holders) but will have no impact on analytical aggregates (net assets, net lending/borrowing).

### Valuation of loans and placements

15.47 Financial institutions make a general provision for loan losses based on known characteristics of the loan portfolio and its performance over time. Because the provision is general, the specific loan contracts and the counterpart liability incurred are not identifiable, making it conceptually difficult to record such a provision in the 2008 SNA accounting structure. By contrast, specific provisions for impairment arising from poor performance (non-performing) of an individual loan contract are more certain as to likely occurrence and counterparty identification.

15.48 The 2008 SNA recommends valuation of loans in the balance sheet at nominal value, with non-performing loans identified and two memorandum items concerning them included in the balance sheet of the creditor. The first is the nominal value of the loans so designated, including any accrued interest and service charges. The second is the market equivalent value of these loans.

15.49 The ABS considers that, in order to maintain consistency regarding the valuation of all financial instruments, market valuation of loans or a close approximate should be recorded. The ASNA takes into account specific loan loss provisions in valuing loan portfolios and their counterparts and as a result the closest approximation to market value or fair value is recorded in the ASNA. The ASNA does not take account of general loan loss provisions. Valuation of loans at nominal values is produced in supplementary tables in the ASNA.

### Monetary gold

15.50 The 2008 SNA definition of monetary gold is gold to which the monetary authority has title and is held as reserve assets. All monetary gold is included in reserve assets or is held by international financial organisations, and is treated as a financial asset even though the holders do not have a claim on other designated units.

15.51 The ASNA treatment of monetary gold departs slightly from the treatment outlined in the 2008 SNA in that a liability of the rest of the world is imputed. The reason for not adopting the 2008 SNA treatment is to preserve consistency with the international investment position (IIP) for Australia within the Financial Accounts. The IIP according to BPM6 permits recording of assets in the form of monetary gold as assets of the domestic economy (i.e. external claims). In re-presenting external claims data in an 2008 SNA framework, the major presentation is to show cross-border positions as assets and liabilities of rest of world. Thus the external assets of BPM6 are represented as foreign liabilities, and external liabilities are represented as foreign assets in the financial accounts. The international investment position (external assets less external liabilities) of BPM6 should be derivable from the Rest of World accounts in the ASNA, i.e. foreign liabilities less foreign assets. Omitting monetary gold from liability positions of the rest of the world will not produce this result. This treatment in ASNA has been adopted mainly to minimise confusion among the users of the statistics.

### Holding companies

15.52 According to the 2008 SNA, holding companies (a unit which holds the assets of subsidiary corporations but does not undertake any management activities) receive the sectoral classification of captive financial institutions and money lenders. This treatment would result in the creation of additional enterprises in situations where currently there are no financial intermediary enterprises in the group. The ASNA treatment for holding companies in the financial accounts and balance sheets is that they receive a sector classification that reflects the major economic activities of the controlled entities.

## FINANCIAL INSTRUMENTS

## Monetary gold and SDRs

### Monetary gold

15.53 The 2008 SNA definition of monetary gold is gold to which the monetary authority has title and is held as reserve assets. It comprises gold bullion (including gold held in allocated gold accounts) and unallocated gold accounts with non-residents that give title to claim the delivery of gold. All monetary gold is included in reserve assets or is held by international financial organisations. Only gold that is held as a financial asset and as a component of foreign reserves is classified as monetary gold. Therefore, except in limited institutional circumstances, gold can be a financial asset only for the central bank or central government. In the 2008 SNA, gold bullion held as a reserve asset is the only financial asset with no corresponding liability.

15.54 The ASNA treatment of monetary gold differs slightly from the treatment outlined in the 2008 SNA in that a liability of the rest of the world is imputed. All other gold held is treated as a physical commodity and classified as either valuables (if the sole purpose is a store of wealth) or as final or intermediate consumption, change in inventories, exports or imports.

### Special Drawing Rights (SDRs)

15.55 SDRs are international reserve assets created by the International Monetary Fund (IMF) and allocated to its members to supplement existing reserve assets. The Special Drawing Rights Department of the IMF manages reserve assets by allocating SDRs among member countries of the IMF and certain international agencies (collectively known as the participants).

15.56 The mechanism by which SDRs are created (referred to as allocations of SDRs) and extinguished (cancellations of SDRs) gives rise to transactions. These transactions are recorded at the gross amount of the allocation and are recorded in the financial accounts of the monetary authority or government of the individual participant on the one hand and the rest of the world representing the participants collectively on the other.

15.57 SDRs are held exclusively by official holders, which are central banks and certain other international agencies, and are transferable among participants and other official holders. SDR holdings represent each holder's assured and unconditional right to obtain other reserve assets, especially foreign exchange, from other IMF members. SDRs are assets with matching liabilities but the assets represent claims on the participants collectively and not on the IMF. A participant may sell some or all of its SDR holdings to another participant and receive other reserve assets, particularly foreign exchange, in return.

15.58 In Australia, the SDR allocation is recorded by the central government and the SDR asset is recorded by the Reserve Bank of Australia (RBA). The RBA has a deposit liability to the central government.

Sources and methods – Quarterly

15.59 The table below outlines the data sources and methods used in the estimation of quarterly monetary gold and SDRs in current prices. Real estimates are calculated for the national balance sheet.

Table 15.1 QUARTERLY MONETARY GOLD AND SDRs

| Item | Comment |
|---|---|
| **Monetary gold** | In Australia, only the Reserve Bank of Australia (RBA) has dealings in monetary gold with the Rest of the World. Source data for monetary gold are based on RBA estimates reported in the ABS Survey of International Investment.<br><br>When gold is sold (or purchased) by the RBA:<br>• to another monetary authority, the exchange is recorded as an exchange of financial assets, and the ASNA imputes a counterparty entry to the rest of the world<br>• in all other cases, gold is first reclassified (recorded in the other changes in volume of assets account as de-monetisation of gold) as commodity gold, and this valuable is sold as commodity gold. |
| **SDRs** | In ASNA, SDRs transactions are carried out by National general government with the International Monetary Fund and National general government exchanges the SDRs with the RBA for cash.<br><br>SDR liabilities are recorded against the National general government and rest of the world. SDR assets are recorded for the RBA and the rest of the world.<br><br>Source data for SDRs are based on RBA estimates reported in the ABS Survey of International Investment. |

## Currency

### Definition

15.60 Currency consists of notes and coins that are of fixed nominal values and are issued or authorised by the central bank or government. A distinction is drawn between domestic currency (that is, currency that is the liability of resident units, such as the central bank and central government) and foreign currencies that are liabilities of non-resident units (such as foreign central banks, other banks and governments).

15.61 For Australia the currency asset refers solely to domestic currency. There is little foreign currency in general circulation, and significant holdings are classified as foreign deposits.

15.62 Notes and coins are treated as liabilities at full face value. The cost of producing the physical notes and coins is recorded as government expenditure and not netted against the receipts from issuing the currency.

### Sources and methods – Quarterly

15.63 In the currency market, all sectors and subsectors can hold currency as assets. In the ASNA, the RBA and the national general government sectors issue domestic currency with the RBA issuing notes and the national general government issuing coins.

15.64 The table below outlines the data sources and methods used in the estimation of quarterly currency by sector in current prices. Real estimates are calculated for the national balance sheet.

Table 15.2 QUARTERLY CURRENCY – by subsector

| Item | Comment |
|---|---|
| **Reserve Bank of Australia** | Data for total notes accepted by the Reserve Bank of Australia (RBA) are obtained from the balance sheet information from the ABS Survey of Financial Information - Reserve Bank of Australia.<br><br>The counterparty asset holders for notes excluding other private non-financial corporations and households are obtained from the suite of balance sheet forms from the ABS Survey of Financial Information and from the suite of Australian Prudential Regulatory Authority's (APRA's) Statement of Financial Position forms.<br><br>A residual asset holding of the notes is calculated as total liabilities less the sum of total assets held (from the ABS and APRA forms). The residual is split equally between other private non-financial corporations and households. |
| **National general government** | Data for total coins accepted by the National general government is obtained from balance sheet information from Commonwealth government ledgers from the Department of Finance and Deregulation;<br><br>The total coin assets are held outside the banking system and are split equally between other private non-financial corporations and households. |
| **Rest of the world** | The main data source for total currencies accepted by the rest of the world and the respective counterparty asset holders are obtained from the ABS Survey of International Investment. |

## Deposits

### Definition

15.65 The 2008 SNA does not provide a precise definition of a deposit. As a result the distinction between deposits and loans in the ASNA is made by the convention that deposit liabilities can only be incurred by institutions included in RBA broad money, and therefore their asset counterpart is similarly restricted. Additionally, the conventions are adopted that all account balances (not evidenced by a security) between broad money institutions are classified as deposits or withdrawable share capital of building societies and that all domestic non-security borrowings by broad money institutions are classified as deposits are adopted. As a result of these conventions there are some classes of financial asset that may be described as deposits, such as account balances at State Treasuries, but which are classified as loans in the ASNA.

15.66 It follows from the convention above (that deposit liabilities can only be incurred by institutions included in RBA broad money) that the following financial institutions should be classified as deposit taking in ASNA: the RBA, banks, credit unions, building societies, cash management trusts and registered financial corporations. However, with the implementation of 2008 SNA in the ASNA, a slight variation occurred as to what institutions are included as a deposit taking institution. Cash management trusts are no longer included (previously the units issued by cash management trusts were classified as deposits); instead they are classified into the new category, money market investment funds.

15.67 In the ASNA deposits are further classified into transferable deposits and other deposits.

*Transferable deposits*

15.68 Transferable deposits comprise all deposits that are exchangeable for banknotes and coins on demand at par and without penalty or restriction and directly usable for making payments by cheque, draft, direct debit/credit or other direct payment facility. A transferable deposit cannot have a negative value. A bank current or checking account, for example, is normally treated as a transferable deposit but if it is overdrawn, the withdrawal of funds to zero is treated as the withdrawal of a deposit and the amount of the overdraft is treated as the granting of a loan.

*Other deposits*

15.69 Other deposits comprise all claims, other than transferable deposits, that are represented by evidence of deposit. Typical forms of deposits that should be included are savings deposits (which are always non-transferable), fixed-term deposits and non-negotiable certificates of deposit. Deposits of limited transferability that are excluded from the category of transferable deposits are included here. Claims on the IMF that are components of international reserves and are not evidenced by loans are recorded in other deposits. Repayable margin payments in cash related to derivative contracts are included in other deposits only when the counterparty is a broad money institution, otherwise it is included as a loan.

Sources and methods – Quarterly

15.70 Deposits data in the ASNA is compiled for both 'Transferable Deposits' and 'Other Deposits'. Data sources defined below have available detailed information on the type of deposit accounts allowing a clear distinction between those of a short-term and long-term nature.

15.71 The ASNA does not make a distinction between deposits and loans for balances and transactions between deposit-taking institutions. For practical reasons, all balances and transactions related to deposits and loans between such institutions are classified as deposits. Similarly, most liability account balances of banks or other depository corporations which are not evidenced by a security are treated as deposits. This treatment is not extended to the rest of the world. The ABS Survey of International Investment provides clear direction for institutions to report their loans and deposits in the survey form.

15.72 The table below outlines the data sources and methods used in the estimation of quarterly deposits by sector in current prices. The estimates are derived at face value. Real estimates are calculated for the national balance sheet.

Table 15.3 QUARTERLY DEPOSITS – by subsector

| Item | Comment |
|---|---|
| **Reserve Bank of Australia** | The main source of data for total deposits accepted by the Reserve Bank of Australia (RBA) and the respective counterparty asset holders are obtained from the ABS Survey of Financial Information - Reserve Bank of Australia. |
| **Banks and other depository corporations** | Data for total deposits accepted by the banks and other depository corporations are obtained from the balance sheet information from the Australian Prudential Regulatory Authority's (APRA's) banks, building societies, credit unions and registered financial corporations Statement of Financial Position forms.<br><br>The counterparty assets holders for deposit excluding other private non-financial corporations are obtained from the suite of balance sheet forms from the ABS Survey of Financial Information, from the suite of APRA 's Statement of Financial Position forms; ABS Survey of International Investment and from the Australian Taxation Office (ATO) quarterly return for self-managed superannuation funds.<br><br>A residual asset holding of deposits is calculated as total liabilities (acceptances) less the sum of total assets held (from the ABS, APRA and ATO forms). The residual is allocated to other private non-financial corporations. |

| | |
|---|---|
| **Rest of the world** | The main data source for total deposits accepted by the rest of the world and the respective counterparty asset holders are obtained from the ABS Survey of International Investment. |

## Debt securities

15.73 A debt security is a negotiable instrument that does not entitle the holder to participate in the residual of the issuer on liquidation. Debt securities are divided into short-term and long-term using the original rather than the remaining term to maturity of the instruments.

### Short-term debt securities

*Definition*

15.74 Short-term debt securities are those with an original term to maturity of one year or less. For Australia most short-term debt securities on issue are discount instruments (the issue value is lower than the face value, the difference representing interest payable) with an original term to maturity ranging between 30 to 180 days.

15.75 Issuers of promissory notes and bills of exchange may negotiate rollover facilities which allow them to use these instruments as sources of floating-rate long-term funds. However, in the ASNA , the existence of rollover facilities is not treated as converting what are legally short-term instruments into long-term instruments (i.e. the ASNA classifies the instrument according to the contracted term at the time of the original drawdown rather than anticipating use of the rollover facility).

15.76 Apart from promissory notes, short-term securities are traded on well-established secondary markets. Treasury Notes are inscribed, but the other instruments in this category are bearer securities.

15.77 There are two types of short-term securities presented in the ASNA:

1. bills of exchange; and
2. one name paper.

#### Bills of exchange

15.78 The 2008 SNA uses the term "bankers acceptance" to describe the instrument known in Australia as a bill of exchange. A bill of exchange is an unconditional order drawn (issued) by one party, sent to another party (usually a bank) for acceptance and made out to, or to the order of, a third party, or to bearer (holder). It is a negotiable instrument with an original term to maturity of 180 days or less. Almost all bills are bank accepted or endorsed because investors expect bills to be the obligation of a first-class credit.

15.79 The bill of exchange represents an unconditional claim on the part of the holder and an unconditional liability on the part of the accepting bank; the bank's counterpart asset is a claim on its customer. As such the ASNA shows two instruments in order to demonstrate each side of this three way transaction. Bills of exchange are treated as financial assets from the time of acceptance, even though funds may not be exchanged until a later stage.

15.80 Bills of exchange are used in international trade finance, liquidity management by banks, money market dealers and corporate treasuries. The data cover only those bills accepted by Australian residents.

#### One name paper

15.81 By contrast with bills of exchange, one name paper is the liability of a single issuer and does not rely on the credit enhancement provided by acceptance. The ASNA data are further classified by "domicility", that is the market into which the issue was made, being in Australia or offshore.

15.82 One name paper includes promissory notes, Treasury Notes and negotiable certificates of deposit issued by banks.

15.83 A promissory note, also called commercial paper, is a written promise to pay a specified sum of money to the bearer at an agreed date. It is usually issued for an original term between 30 and 180 days and is sold to an investor at a simple discount to the value shown on the face of the document. A promissory note is not accepted by a bank and unlike a bill of exchange is not endorsed by the parties which sell it in the market

15.84 Treasury Notes are inscribed instruments issued by the Commonwealth Government and have an original maturity of five, thirteen or twenty-six weeks.

15.85 Bank certificates of deposit are similar to promissory notes except that the drawer is a bank rather than (say) an industrial company. Bank issued certificates of deposit with an original term to maturity of one year or less are called negotiable certificates of deposit.

*Sources and methods – Quarterly*

15.86 The tables below outline the data sources and methods used in the estimation of quarterly short-term debt securities in current prices. The estimates are valued at market prices. Real estimates are calculated for the national balance sheet.

Table 15.4 QUARTERLY SHORT-TERM DEBT SECURITIES – Bills of exchange

| Item | Comment |
|---|---|
| **Banks acceptances** | Data for bank accepted bills of exchange is sourced from the monthly Australian Prudential Regulatory Authority (APRA) Bank Bills Acceptances and Endorsement form. |
| **Holdings of banks acceptances** | The counterparty assets holders for bills of exchange are obtained from the suite of balance sheet forms from the ABS Survey of Financial Information, from the suite of APRA's Statement of Financial Position forms; and ABS Survey of International Investment.<br><br>The total reported holdings of bank accepted bills is adjusted to align with the reported acceptances by banks**.**<br><br>A residual asset holding of bills of exchange is calculated as total bank bills of exchange acceptances less the sum of total assets held (from the ABS and APRA forms). The residual is allocated to the household sector, but other sectors may be adjusted due to reporting errors, incorrect classifications, under coverage or conflicting data sources. |
| **Transactions and price change** | Price change effects for these instruments are small in aggregate due to the short-term nature of the contracts. In practice, transactions are derived from stock levels. |

Table 15.5 QUARTERLY SHORT-TERM DEBT SECURITIES – One name paper

| Item | Comment |
|---|---|
| **One name paper issuance by domestic sector and subsector** | Data for one name paper are sourced from – Australian Prudential Regulatory Authority's (APRA's) Bank and Registered Financial Corporations Debt Securities Issued forms; Suite of balance sheet forms from the ABS Survey of Financial Information.<br><br>Supplementary data sources from the Reserve Bank of Australia (RBA), the Australian Office of Financial Management and Austraclear. |
| **Holdings of one name paper by issuing sector and subsector** | The counterparty assets holders for one name paper are obtained from the suite of balance sheet forms from the ABS Survey of Financial Information, the suite of APRA's Statement of Financial Position and Debt Securities Held forms; and ABS Survey of International Investment.<br><br>The total reported holdings of one name paper are adjusted to align with the reported issuance of one name paper. |

| | |
|---|---|
| | A residual asset holding of one name paper is calculated as total one name paper issuance less the sum of total assets held (from the ABS and APRA forms). The residual is allocated to the household sector, but other sectors may be adjusted due to reporting errors, incorrect classifications, under coverage or conflicting data sources. |
| **Transactions and price change** | Price change effects for these instruments are small in aggregate due to the short-term nature of the contracts. In practice, transactions are derived from stock levels. |
| **Rest of the world** | The main data source for one name paper issued by the rest of the world and the respective counterparty asset holders are obtained from the ABS Survey of International Investment.<br><br>Price changes are obtained directly and modelled, mainly related to foreign currency. Transactions are derived by applying price changes when not directly available from source data. |

Long-term debt securities

*Definition*

15.87 Long-term debt securities include those securities that have an original maturity of more than one year. Each consists of a document that represents the issuer's pledge to pay the holder the sum of money shown on the face of the document, on a date which at the time of issue is more than one year in the future. Many bonds on issue in Australia pay interest at a set percentage of face value every six months (known as "coupon interest") for the life of the bond. Such bonds are known as fixed interest bonds. However, there are a significant amount of variable rate bonds and some deep discount (or zero coupon) bonds on issue.

15.88 Long-term debt securities are frequently borrowed by market makers to cover short positions. Where identified, stock loans of this nature are treated in the ASNA as securities' trades. Repurchase agreements, which are also used to cover short positions, are treated as purchases and sales of debt securities.

15.89 Asset-backed securities are arrangements under which payments of interest and principal are backed by payments on specified assets or income streams. Asset-backed securities may be issued by a specific holding unit or vehicle, which issues securities that are sold to raise funds to pay the originator for the underlying assets. Asset-backed securities are classified as debt securities because the security issuers have a requirement to make payments, while the holders do not have a residual claim on the underlying assets. Asset-backed securities are backed by various types of financial assets, for example, mortgages and credit card loans.

15.90 Non-participating preferred stocks or shares are those that pay a fixed income but do not provide for participation in the distribution of the residual value of an incorporated enterprise on dissolution. These shares are classified as debt securities. Bonds that are convertible into equity are classified in this category prior to the time that they are converted.

15.91 Long-term debt securities issued in Australia include:

- Treasury bonds issued by the Commonwealth Government;
- Various series of inscribed stock which are issued by the central borrowing authorities and other government-owned corporations. These are known as semi-government securities;
- Debentures, transferable certificates of deposit, and unsecured notes, which are collectively called corporate securities or medium-term notes;
- Asset-backed bonds including mortgage-backed bonds;
- Covered bonds, issued by authorised deposit taking institutions;
- Kangaroo bonds, which are foreign bonds issued in the Australian market; and

- Convertible notes prior to conversion.

15.92 The data are further classified by "domicility", that is the market into which the issue was made, being in Australia or offshore.

*Sources and methods – Quarterly*

15.93 The table below outlines the data sources and methods used in the estimation of quarterly long-term debt securities, i.e. bonds in current prices. The estimates are valued at market prices. Real estimates are calculated for the national balance sheet.

Table 15.6 QUARTERLY LONG-TERM DEBT SECURITIES

| Item | Comment |
|---|---|
| **Bonds issued by domestic sector and subsector** | Data for bonds issued are sourced from – Australian Prudential Regulatory Authority's (APRA's) Bank and Registered Financial Corporations Debt Securities Issued forms; Suite of balance sheet forms from the ABS Survey of Financial Information.<br><br>Supplementary data sources from the Reserve Bank of Australia (RBA), the Australian Office of Financial Management and Austraclear. |
| **Holdings of bonds by issuing sector and subsector** | The counterparty assets holders for bonds are obtained from the suite of balance sheet forms from the ABS Survey of Financial Information, the suite of APRA's Statement of Financial Position, Securities Subject to Repurchase, Resale and Stock lending and Borrowing and Debt Securities Held forms; RBA Repurchase Agreement Schedule and ABS Survey of International Investment.<br><br>The total reported holdings of bonds are adjusted to align with the reported issuance of bonds.<br><br>A residual asset holding of bonds is calculated as total bonds issuance less the sum of total assets held (from the ABS and APRA forms). The residual is allocated to the household sector, but other sectors may be adjusted due to reporting errors, incorrect classifications, under coverage or conflicting data sources. |
| **Transactions and price change** | For each issuing sector, price changes are derived using specific market bond indexes to enable the derivation of transactions when not directly available from source data. |
| **Rest of the world** | The main data source for bonds issued by the rest of the world and the respective counterparty asset holders are obtained from the ABS Survey of International Investment.<br><br>For rest of the world issuance and rest of the world asset holdings price changes are derived using specific market bond indexes to enable the derivation of transactions when not directly available from source data. |

## Derivatives

### Definition

15.94 Derivatives are financial instruments that are linked to a specific financial instrument or commodity, through which specific financial risks can be traded in financial markets in their own right. Examples are swaps, forward contracts, futures contracts and options. In the ASNA, derivatives are treated as debt securities irrespective of the nature of the underlying asset. The value of a derivative derives from the price of the underlying item: the reference price. The reference price may relate to a commodity, a financial asset, an interest rate, an exchange rate, another derivative or a spread between two prices.

15.95 An employee stock option is an agreement made on a given date (the "grant" date) under which an employee may purchase a given number of shares of the employer's stock at a stated price (the "strike" price) either at a stated time (the "vesting" date) or within a period of time (the "exercise" period) immediately following the vesting date. Transactions in employee stock options are recorded in the financial account as the counterpart to the element of compensation of employees represented by the value of the stock option. The ASNA does not record employee stock options separately, due to unavailability of source data.

15.96 Margins are payments of cash or collateral that cover actual or potential obligations under derivatives, especially futures contracts or exchange-traded options. Repayable margins consist of deposits or other collateral deposited to protect a counterparty against default risk, but that remain under the ownership of the unit that placed the margins. Although its use may be restricted, a deposit is classified as repayable if the depositor retains the risks and rewards of ownership.

15.97 Repayable margin payments in cash are transactions in deposits, not transactions in a derivative. The depositor has a claim on the exchange or other institution holding the deposit. In the ASNA margins on derivatives are recorded as loans rather than deposits.

### Sources and methods – Quarterly

15.98 The table below outlines the data sources and methods used in the estimation of quarterly derivatives in current prices. Real estimates are calculated for the national balance sheet.

Table 15.7 QUARTERLY DERIVATIVES

| Item | Comment |
|---|---|
| **Levels (closing positions) and transactions (settlements during the period)** | Source data for the derivatives market is obtained from the ABS Survey of International Investment.<br><br>The survey provides information on derivatives assets and liabilities contracts between each resident sector and the rest of the world.<br><br>The survey includes detail about opening and closing positions, settlements (receipts and payments), valuation and other changes (market price, exchange rate and other changes), country of non-resident creditor/debtor and residual maturity.<br><br>All values relate to derivative contracts independent of their underlying assets and are valued on a mark to market basis.<br><br>The survey collects derivative information at the aggregate level only and does not collect information by a specific type (options, cross-currency swaps, etc.). No data source is currently utilised for the domestic market. |
| **Domestic counterparty** | The domestic data collected by the ABS through the suite of balance sheet forms from the ABS Survey of Financial Information and the suite of the Australian Prudential Regulatory Authority's (APRA's) Statement of Financial Position has proved to be not fit for purpose. This situation has arisen due to differences in objectives between commercial accounting |

and the 2008 SNA. In reporting derivatives, commercial accounting concentrates on measuring net gains/losses (changes in value) from a portfolio rather than separating changes of value into income transactions, financial transactions and revaluation components required by the 2008 SNA. Under these circumstances the ASNA has had to resort to modelled estimates.

The model was developed to estimate more detailed domestic sectoral counterparty splits. The model derives counterparty splits by applying factors to the assets and liabilities issued by banks and held by the rest of the world. These factors were calculated using information obtained from Australian responses to the Bank of International Settlement Survey of Foreign Exchange and Derivatives Markets supported by prudential surveys.

## Loans and placements

### Definition

15.99 Loans are borrowings which are not evidenced by the issue of debt securities, and are not usually traded and their value does not decline even in a period of rising interest rates. Examples are an overdraft from a bank, money lent by a building society with a mortgage over a property as collateral, and a financial lease agreement with a finance company. Repurchase agreements between deposit-taking institutions are treated as purchases and sales of debt securities, not collaterised loans. Undrawn lines of credit are not recognised as loans because the liabilities are contingent.

15.100 Placements are customers' account balances with entities not regarded as deposit-taking institutions. Examples are account balances of State and local public non-financial corporations with their central borrowing authorities, of public sector pension funds with their State Treasuries, and 11am money placed with corporate treasuries.

15.101 The values of loans to be recorded in the balance sheets of both creditors and debtors are the amounts of the market value of the principal and interest outstanding. This amount includes any interest that has been earned but not been paid. It should also include any amount of indirectly measured service charge (the difference between bank interest and SNA interest) due on the loan that has accrued and not been paid. Accrued interest is shown under accounts receivable or payable. The value of a loan does not reflect the consequences of any interest payments due after the date of the balance sheet, even if these were specified in the original loan agreement. In practice, loans are valued at nominal value less specific loan loss provisions.

15.102 Loans may be divided, on a supplementary basis, between short- and long-term loans. Short-term loans comprise loans that have an original maturity of one year or less. Loans repayable on the demand of the creditor should be classified as short-term even when these loans are expected to be outstanding for more than one year. In the ASNA, this includes credit cards and other forms of revolving credit as well as some placements between state governments and their respective central borrowing authorities.

15.103 Long-term loans comprise loans that have an original maturity of more than one year and which are not classified as short-term. This category includes residential mortgages.

Sources and methods – Quarterly

15.104 As recommended by the 2008 SNA, the ASNA splits the loans market between short-term and long-term loans and placements. Broadly speaking, this is defined according to original term to maturity. Unlike those for deposits, short and long-term splits for loans are not available directly from most data sources (except banks, building societies, credit unions and registered financial corporations, the forms on Statement of Financial Position provide detailed splits for households between short and long-term loans).

15.105 The ASNA makes the assumption that the majority of loans for the non-household sector are of a long-term nature and an approximate ratio of 80:20 is implemented to dissect data between long-term and short-term maturities.

15.106 The table below outlines the data sources and methods used in the estimation of quarterly loans and placements by sector in current prices. They are valued at market prices. Volume/real estimates are calculated for the national balance sheet.

Table 15.8 QUARTERLY LOANS AND PLACEMENTS – by sector

| Item | Comment |
|---|---|
| **Banks and other depository corporations** | Data for total loans issued by the banks and other depository corporations and their respective counterparty liability holders are obtained from the balance sheet information from the Australian Prudential Regulatory Authority (APRA) banks, building societies, credit unions and registered financial corporations Statement of Financial Position. |
| **Securitisers and CBA's** | Data for total loans issued by securitisers and central borrowing authorities and their respective counterparty liability holders are obtained from the balance sheet information from the ABS Survey of Financial Information-Securitisers and the Government and Other Entities form. |
| **Loans and other placements with all other financial institutions and national general government** | Data for total loans and placements issued by all financial institutions and the Commonwealth government and their respective counterparty liability holders are obtained from the balance sheet information from the ABS Survey of Financial Information; from the suite of APRA's Statement of Financial Position forms; and balance sheet information from Commonwealth government ledgers from Department of Finance and Deregulation. |
| **Rest of the world** | The main data source for total loans issued by the rest of the world and the respective counterparty liability holders are obtained from the ABS *Survey of International Investment*. |

## Shares and other equity

### Definition

15.107 Equity has the distinguishing feature that the holders own a residual claim on the assets of the institutional unit that issued the equity. Equity represents the owner's funds in the institutional unit. In contrast to debt, equity does not generally provide the owner with a right to a predetermined amount or an amount determined according to a fixed formula. Equity is treated as a liability of the issuing institutional unit (a corporation or other unit). Ownership of equity in legal entities is usually evidenced by, for example, shares, stocks or investment fund units.

15.108 Equities are sub-divided into listed shares and unlisted shares; both types of shares are negotiable and so are classified as equity securities.

15.109 The 2008 SNA also recommends that equity other than shares be presented separately. The data requirements and workloads associated with this recommendation are such that the ASNA has not followed this recommendation. The 2008 SNA "Other equity" is combined with shares data in the financial accounts. In practice this means units in investment funds are treated as shares.

*Listed shares and other equities*

15.110 Listed shares are equity securities listed on an exchange. They are also referred to as quoted shares. The existence of quoted prices of shares listed on an exchange means that current market prices are usually readily available. In the ASNA, statistics for listed shares are restricted to those equities listed on the Australian Securities Exchanges (ASX). Data sources cannot support classification of foreign shares to listed or unlisted categories.

*Unlisted shares and other equities*

15.111 Unlisted shares are equity securities not listed on an exchange. Unlisted shares can also be called private equity; venture capital usually takes this form. Unlisted shares tend to be issued by direct foreign investment subsidiaries and smaller scale businesses and typically have different regulatory requirements but neither qualification is necessarily the case.

15.112 For unlisted shares, there may be no observable market prices for positions in equity not listed on a stock exchange. This situation often arises for direct investment enterprises, private equity, equity in unlisted and delisted companies, listed but liquid companies, joint ventures, and unincorporated enterprises. When actual market values are not available, an estimate is required, such as estimating own funds at net asset value of an enterprise.

Sources and methods – Quarterly

15.113 The tables below outline the data sources and methods used in the estimation of quarterly listed and unlisted shares and other equity in current prices. The estimates for listed shares are valued at market prices. Volume/real estimates are calculated for the national balance sheet.

Table 15.9 QUARTERLY SHARES AND OTHER EQUITY– Listed shares and other equity

| Item | Comment |
|---|---|
| **Stocks** | |
| Total liability issuance by sector and subsector | Data for listed shares and other equity is sourced from the Australian Securities Exchange (ASX) market capitalisation files.<br><br>The ASX market capitalisation data are used to generate outstanding liability totals for each issuing sector of the economy through sectoring under the SISCA classifications and determination of type of equity on issue. |
| Holding of issuing sector by counterparty | The counterparty assets holders for listed shares are obtained from the suite of balance sheet forms from the ABS Survey of Financial Information, the suite of Australian Prudential Regulatory Authority's (APRA's) Statement of Financial Position and Equity Securities Held forms, and the ABS Survey of International Investment.<br><br>The total reported holdings of listed shares are adjusted to align with the reported issuance of listed shares.<br><br>A residual asset holding of listed shares is calculated as total listed shares issuance less the sum of total assets held (from the ABS and APRA forms). The residual is allocated to the household sector, but other sectors may be adjusted due to reporting errors, incorrect classifications, under coverage or conflicting data sources. |
| **Transactions** | Transactions are sourced through a separate ASX transactions data source. |

| | |
|---|---|
| | Transactions are allocated to appropriate issuing sectors using sectoral classification identifiers based on SISCA classifications and attributed to individual companies and aggregated to form transactions totals for each issuing sector.<br><br>The aggregates are distributed to holding sectors based on proportional holdings estimated from stock data (see methodology above).<br><br>Further, transaction adjustments are made to account for reinvested earnings of investment funds and adjustments made to quality assure estimates of pension fund insurance technical reserves. |

Table 15.10 QUARTERLY SHARES AND OTHER EQUITY – Unlisted shares and other equity

| Item | Comment |
|---|---|
| **Stocks** | The compilation methodology for the unlisted share market varies for issuing sector and subsector due to data quality and availability of unlisted share issuance estimates. |
| **Banks, money market funds (MMF), non-money market funds (NMMF), securitisers and rest of the world** | |
| Total liability issuance by sector and subsector | Data for unlisted shares and other equity are sourced from the ABS Survey of Financial Information - Money Market and Non-Money Market Financial Investment Funds, Securitisers; Australian Prudential Regulatory Authority (APRA) Banks Statement of Financial Position and ABS Survey of International Investment.<br><br>Some of these issuing sectors are known to have some data quality problems. For those subsectors, liability data are adjusted based on economic intelligence and analysis of the asset holdings. |
| Holdings of issuing sector by counterparty | The counterparty assets holders for unlisted shares are obtained from the suite of balance sheet forms from the ABS Survey of Financial Information, the suite of APRA's Statement of Financial Position and Equity Securities Held forms, and ABS Survey of International Investment.<br><br>The total reported holdings of unlisted shares are adjusted to align with the reported issuance of unlisted shares.<br><br>A residual asset holding of unlisted shares is calculated as total unlisted shares issuance less the sum of total assets held (from the ABS and APRA forms). The residual is allocated to the household sector, but other sectors may be adjusted due to reporting errors, incorrect classifications, under coverage, or conflicting data sources. |
| **Public sector – National, State and Local public non-financial corporations, CBAs and other financial corporations** | The counterparty asset holders for unlisted shares are obtained from the off balance sheet forms from the ABS Survey of Financial Information - Government and Other Entities.<br><br>The total reported holdings of unlisted shares are summed to generate the total issuance of unlisted shares.<br><br>As these are public sector units obtaining a market valuation is the major problem rather than an under-coverage of assets holders.<br><br>The data presented in ASNA for other financial corporations is only for the public sector, the private sector units are not estimated due to the unavailability of data. |

| | |
|---|---|
| **Private sector – all other private financial units** | The counterparty assets holders for unlisted shares are obtained from the of balance sheet forms from the ABS Survey of Financial Information - Non-Money Market Financial Investment Funds,(property trusts) and Life Insurance Companies and Friendly Societies; APRA Statement of Financial Position - General Insurance, Registered Financial Corporations and Building Societies.<br><br>The total reported holdings of unlisted shares are summed to generate the total issuance of unlisted shares.<br><br>The major problems with the estimates are market valuation and possible under-coverage. Adjustments are made for known under coverage usually identified through market intelligence. |
| **Transactions** | Where available, transactions are recorded for unlisted equity. Transactions are not recorded where the data are of inadequate quality. The majority of transactions are recorded for the non-money market investment funds and rest of the world sector issuing sectors. Transactions for the non-money market investment funds are derived using market indexes in proportion to the outstanding unlisted equity holding by other sectors and include those funds reinvested into the corporation by the holding sectors. Rest of the world transactions are from the Survey of International Investment. Adjustments made to align insurance technical reserves are also applied to the unlisted equity market. |

## Net equity in reserves

### Definition

15.114 Net equity in reserves represents policy-holders' claims on life insurance businesses and pension funds. These technical reserves are calculated by deducting all repayable liabilities from the value of total assets. It comprises the following:

- Household claims on technical reserves of life insurance corporations and pension funds: this category represents households' net equity in, or claims on, the reserves of life insurance corporations and pension funds. In the case of life insurance corporations, it equates in large measure with the net policy liabilities of life offices to households. In the case of pension funds, it represents the funds' obligations to members including any surpluses and reserves. A claim by householders on insurance technical reserve of non-resident pension funds is also included in the ASNA.
- Pension fund claims on life insurance corporations reserves: This category represents pension funds' net equity in, or claims on, life insurance corporation reserves. A significant number of pension funds invest their members' contributions in the statutory funds of life insurance corporations. These investments are typically held as unit-linked insurance or investment policies.

### Sources and methods – Quarterly

15.115 The table below outlines the data sources and methods used in the estimation of quarterly net equity in reserves in current prices. Volume/real estimates are calculated for the national balance sheet.

Table 15.11 QUARTERLY NET EQUITY IN RESERVES

| Item | Comment |
|---|---|
| **Net equity in reserves** | This represents both net equity of pension funds in life offices and net equity of households in pension, life insurance and rest of the world reserves.<br><br>Pension funds claims on life insurance corporations reserves represents |

net equity of pension funds in life offices, these data are collected directly the from Australian Prudential Regulatory Authority (APRA) Quarterly Superannuation Statement of Financial Position.

In the ASNA, rather than trying to source data on household claims on technical reserves of life insurance corporations and pension funds directly, estimates are derived residually from the balance sheets of pension funds and life insurance sectors. It follows that if reasonably accurate measurements of stocks/flows of the total assets and the repayable liabilities of pension and life insurance are compiled, an accurate measure of net equity in reserves (the residual) may be derived.

Life insurance technical reserves are calculated as the difference between total assets (financial and non-financial) and the liabilities including shareholder equity.

Pension funds technical reserves are calculated as the difference between total assets (financial and non-financial) and the repayable liabilities.

The data sources to derive household claims on pension funds and life insurance net equity in reserves are dependent on source data and methodology outlined in paragraphs 15.04 to 15.13 for compilation of financial instruments.

For life insurance companies, non-financial assets and for shareholders equity are derived from ABS Survey of Financial Information - Life Insurance Companies and Friendly Societies.

For pension funds non-financial assets are from the balance sheet information: from the APRA Quarterly Superannuation Statement of Financial Position; quarterly return from ATO for self-managed superannuation funds and from the ABS Survey of Financial Information - Investment Managers.

Rest of the world insurance technical reserves are generated from models using direct source data from the ABS Survey of International Investment.

## Unfunded superannuation claims

### Definition

15.116 Unfunded superannuation claims represent the liabilities of the general government sector to public sector employees in respect of unfunded retirement benefits. In Australia most governments operate, or used to operate, superannuation schemes for their employees that are unfunded or only partly funded. Some government unfunded superannuation schemes have one component funded through direct employee contributions, and another (the employers' contributions) which is unfunded. Other government unfunded superannuation schemes comprise only an unfunded employer component.

### Sources and methods – Quarterly

15.117 Direct data sources are used to compile unfunded public sector superannuation claims. The outstanding liability in relation to unfunded superannuation claims is recorded as a liability in the general government sectors and as an asset in the household sector.

15.118 The main data on National General Government by counterparties are obtained from balance sheet information from Commonwealth Government Ledgers from the Department of Finance and Deregulation. The main data on State and Local General Government by counterparties are obtained from Government Finance Statistics.

15.119 Unfunded superannuation claims have been recognised in government accounts since jurisdictions moved to accrual accounting. Prior to the change in accounting methods, the ABS developed a set of historical estimates for outstanding liabilities and changes in liabilities for national accounting purposes.

### Prepayment of premiums and reserves against outstanding claims

#### Definition

15.120 Prepayments of premiums and reserves against outstanding claims represents policy-holders' net equity in, or claims on, the reserves of general insurance corporations. They equate to prepayments of premiums and reserves held to cover outstanding claims.

15.121 They consist of premiums paid but not yet earned (called unearned premiums) and claims due but not yet settled, including cases where the amount is in dispute or the event leading to the claim has not yet been reported (called claims outstanding).

#### Sources and methods – Quarterly

15.122 The table below outlines the data sources and methods used in the estimation of quarterly prepayments of premiums and reserves against outstanding claims in current prices. Volume/real estimates are calculated for the national balance sheet.

Table 15.12 QUARTERLY PREPAYMENT OF PREMIUMS AND RESERVES AGAINST OUTSTANDING CLAIMS

| Item | Comment |
|---|---|
| **Prepayments of premiums and reserves against outstanding claims** | Prepayments of premiums and reserves against outstanding claims are constructed using unearned premiums and claims outstanding data from the following balance sheet data:<br>• for private general insurers, from Australian Prudential Regulatory Authority (APRA) Quarterly General Insurance Statement of Financial Position *;*<br>• for public insurers, from the ABS Survey of Financial Information - Government and Other Entities*;*<br>• for health insurers, from the annual Private Health Insurance Administration Council (PHIAC) publication *Operations of the Registered Health Benefits Organisations.* Quarterly data are modelled from the annual data. |

### Other accounts receivable and payable

#### Definition

15.123 This category comprises trade credit for goods and services extended to corporations, government, NPISHs, households and the rest of the world, and advances for work that is in progress (if classified as such under inventories) or is to be undertaken. Trade credits and advances do not include loans to finance trade credit, which are classified as loans.

15.124 The ASNA does not separate the two categories of accounts payable/receivable into short-term and long-term.

Sources and methods – Quarterly

15.125 The table below outlines the data sources and methods used in the estimation of quarterly accounts receivable and accounts payable by sector in current prices. The estimates are derived at face value. Volume/real estimates are calculated for the national balance sheet.

Table 15.13 QUARTERLY ACCOUNTS RECEIVABLE AND ACCOUNTS PAYABLE – by sector

| Item | Comment |
|---|---|
| **National general government** | The main data on national general government accounts receivable and payable by counterparties are obtained from balance sheet information from Commonwealth government ledgers from the Department of Finance and Deregulation. |
| **All other resident sectors** | The main data for all other domestic sectors on accounts receivable and payable are obtained from the suite of balance sheet forms from the ABS *Survey of Financial Information,* from the suite of Australian Prudential Regulatory Authority's (APRA's) Statement of Financial Position forms; and from the Australian Taxation Office quarterly return for self-managed superannuation funds. |
| **Rest of the world** | The main data on rest of the world accounts receivable and payable by counterparties are obtained from the ABS Survey of International Investment. |

Sources and methods - annual

15.126 Annual financial accounts and balance sheets are not compiled separately in the ASNA. Annual estimates published in the ASNA for financial accounts are the sum of four quarters and the annual stock estimates are the quarterly estimates as at 30 June.

# CHAPTER 16 THE OTHER CHANGES IN THE VOLUME OF ASSETS ACCOUNT

## REVALUATIONS AND OTHER CHANGES IN THE VOLUME OF ASSETS ACCOUNT

### Introduction

16.1 In the ASNA, accumulation entries for revaluations and other changes in the volume of assets are recorded in the Balance sheets that reconciles these entries with the opening balance sheet, transactions during the accounting period and the closing balance sheet. That is, they are not presented as separate accounts but integrated with the opening and closing balance sheets as well as the capital and financial accounts to obtain net worth.

16.2 These accounts record the changes in the values of assets and liabilities that result from flows that are not transactions. These are referred to as other flows. They record significant changes in the value and composition of items between the opening and closing balance sheets due to factors other than transactions (the 2008 SNA defines a transaction as "an economic flow that is an exchange of value between institutional units by mutual agreement").

16.3 Other flows (revaluations and other volume changes) are useful for analysing changes in wealth not explained by transactions in assets or liabilities. An example of such analysis is Table 21 "Analytical measures of income, saving and wealth" in ABS cat. no. 5204.0 (table 12 in the equivalent electronic tables) that includes changes in wealth due to asset prices and other gains/losses, for example, from discoveries of natural resources or destruction of property by natural disasters.

### Revaluations account

16.4 Revaluations are holding gains or losses arising from changes in the market prices of assets and liabilities during the accounting period. Holding gains and losses (also referred to as nominal holding gains and losses) are assets and liabilities that remain qualitatively and quantitatively unchanged during the accounting period. Thus, changes in the value of physical assets that are attributable to some physical or economic transformation, whether improvement or deterioration, are not recorded as holding gains or losses. In particular, the decline in the value of fixed assets arising from physical deterioration, obsolescence or accidental damage is not a holding loss but is recorded in consumption of fixed capital or other changes in the volume of assets. Increases in value from growth of natural assets are recorded with other changes in the volume of assets.

16.5 Nominal holding gains and losses can be decomposed into neutral holding gains and losses, which are in line with the change in the general level of prices, and real holding gains and losses, which are changes that are above or below the change in the general level of prices.

### Other changes in the volume of assets account

16.6 Other changes in the volume of assets are changes in the value of assets and liabilities over the accounting period arising from events other than transactions and revaluations. One important function of the other changes in the volume of assets account is to allow certain assets to enter and leave the system other than by transactions. The acts of entering and exiting from the balance sheet are referred to as economic appearances and disappearances. Some examples of entrances and exits are:

- when naturally occurring assets, such as subsoil assets, gain economic value or become worthless;
- as a result of interactions between institutional units and nature (as opposed to a transaction which is the interaction between two institutional units); and
- assets created by human activity, such as valuables and purchased goodwill.

16.7 The second function is to record the effects of exceptional, unanticipated events that affect the economic benefits derivable from assets and is referred to as the effect of external events. These events include those that destroy assets such as natural disasters and war as well as when an institutional unit removes an asset from its owner without consent.

16.8 A third function is to record changes in classifications of institutional units and assets and in the structure of institutional units.

## HOLDING GAINS

### Introduction

16.9 Holding gains and losses arise from changes in assets, liabilities and net worth over time in the level and structure of prices. Holding gains accrue purely as a result of holding assets over time without transforming them in any way. Holding gains include not only gains on capital such as fixed assets, land and financial assets but also gains on inventories of all kinds of goods held by producers.

16.10 A holding gain (loss) is realised when an asset that has increased (decreased) in value due to holding gains (losses) since the beginning of the accounting period is sold, redeemed, used or otherwise disposed of, or a liability incorporating a holding gain or loss is repaid. An unrealised holding gain is one accruing on an asset that is still owned or a liability that is still outstanding at the end of the accounting period.

16.11 The nominal holding gain on a non-financial asset is the value of the benefit accruing to the owner of that asset as a result of a change in its price over a period of time. The nominal holding gain on a financial asset is the increase in value of the asset, other than transactions in the assets (including the accrual of interest over a period of time) and other changes in the volume of assets. The nominal holding gain on a liability is the decrease in value of the liability, other than by transactions or by other volume changes. Nominal holding gains (losses) are decomposed into neutral holding gains and real holding gains.

16.12 A neutral holding gain (loss) over a period is the increase (decrease) in the value of an asset that would be required, in the absence of transactions and other changes in the volume of assets, to maintain command over the same amount of goods and services as at the beginning of the period (i.e. it is the increase in the value of the asset required to preserve exactly the same volume of goods and services).

16.13 A real holding gain (loss) is the amount by which the value of an asset increases (decreases) over the neutral holding gain for the period, in the absence of transactions and other changes in the volume of assets (i.e. it is the difference between the nominal holding gain (loss) and the neutral holding gain (loss) for the same asset over the same time period).

### Holding gains on fixed assets

16.14 Nominal holding gains may occur on existing fixed assets either because of general inflation or because the price of the asset itself changes over time. When assets of the same kind are still being produced and sold on the market, an existing asset should be valued in the opening or closing balance sheet at the current purchaser's price of a newly produced asset less the accumulated consumption of fixed capital up to that time also calculated on the basis of the prices prevailing at the time the balance sheet is drawn up. When new assets of the same type are no longer being produced, the valuation of existing assets may pose difficult conceptual and practical problems. If broadly similar kinds of assets are still being produced, even though their characteristics may differ significantly from those of existing assets (for example, new models of vehicles or aircraft), it may be reasonable to assume that, if the existing assets were still being produced, their prices would have moved in the same way as those of new assets. However, such an assumption becomes questionable when the characteristics of new assets are much improved by technical progress.

### Holding gains on inventories

16.15 The estimation of nominal holding gains on inventories is difficult because of lack of data on transactions or other volume changes in inventories. Goods entering inventories can be regarded as being acquired by the owner of an enterprise from itself as producer, while goods leaving inventories can be regarded as being disposed of by the owner to the producer for use in production or for sale. These internal transactions should be valued at the prices prevailing at the times they take place. The value of withdrawals thus includes any holding gains on the inventories when stored and this ensures that the value of the holding gain is not included in output. However, when the storage of goods is essentially an extension of the process of production, the increase in the value of the goods that is due to this production is not to be counted as a nominal holding gain. In the case of goods for resale, the value of the goods when withdrawn from inventory should include the value of any holding gain or loss that has occurred while they were in store but not the value of any margin to be realised by the wholesaler or retailer.

16.16 Other volume changes are likely to consist of inventories of goods destroyed as a result of exceptional events such as natural disasters (floods, earthquakes, etc.) or major fires. Recurrent losses of goods from inventories, such as losses due to regular wastage or pilfering, are treated in the same way as deliberate withdrawals. Nominal holding gains on inventories thus relate only to the level of inventories once both exceptional and recurrent losses on inventories have been taken into account.

### Financial assets and liabilities

16.17 Because it is not always appropriate to describe financial assets and liabilities as having a price, holding gains and losses appear to be treated differently for different categories though the same basic principles apply to all categories.

- Monetary gold is subject to nominal and real holding gains and losses because of changes in the exchange rate as well as in the price of gold itself.
- The value of Special Drawing Rights (SDRs) is always subject to nominal and real holding gains and losses since the value of the SDR is based on a basket of four key currencies.
- Domestic currency, deposits and loans, and other accounts receivable and payable are not subject to any nominal holding gains or losses as they are denominated in domestic currency. However, although the nominal holding gains are zero, the neutral holding gains on currency are not. Under inflation, neutral holding gains are positive and so the associated real holding gains are negative and of an equal size.
- Bond price changes that are attributable to changes in market rates of interest constitute price and not volume changes. Therefore, they generate nominal holding gains or losses for both the issuers and the holders of the bonds. An increase in interest rates generates a nominal holding gain for the issuer of the bond and an equal nominal holding loss for the holder of the bond, and vice versa in the case of a fall in interest rates.
- Nominal holding gains or losses may accrue on bills in the same way as for bonds. However, as bills are short-term securities with much shorter times to maturity, the holding gains generated by interest rate changes are generally much smaller than on bonds with the same face values.
- For listed shares and investment fund shares and units, and derivatives, market prices exist and therefore holding gains and losses exist similar to inventories with no storage component.
- For other forms of equity, holding gains are calculated as the sum of holding gains on assets less the holding gains on liabilities.

## OTHER CHANGES IN THE VOLUME OF ASSETS

### Introduction

16.18 The entries in the other changes in assets accounts cover many different kinds of changes in assets, liabilities and net worth. Some of these are particular to the type of asset concerned, while others may apply to all types of assets.

16.19 Other changes in the volume of assets are categorised as follows:

- *Economic appearance of non-produced non-financial assets* - includes natural resources; contracts, leases and licences; and goodwill and marketing assets.
- *Economic appearance of produced non-financial assets* - includes valuables and historic monuments which, for various reasons (e.g. not thought previously to be of value), have hitherto been excluded from the balance sheets.
- *Economic disappearance of non-produced non-financial assets* - includes depletion of natural economic assets such as forests and subsoil assets as a result of physical removal and use, reassessment of subsoil assets as no longer exploitable; negative quality changes arising from changes in use; degradation due to use in economic activity; cancellation of contracts, leases and licences; and write-offs or write-downs of patents and goodwill.

- *Catastrophic losses* - losses of produced and non-produced assets from (i) earthquakes, volcanic eruptions, tidal waves, hurricanes, drought and other natural disasters; (ii) acts of war, riots, other political events; and (iii) technological accidents such as toxic spills and inadvertent release of radioactive materials.
- *Uncompensated seizures* - includes seizures of assets by governments or other institutional units; such seizures may be in contravention of national or international law (excludes foreclosures and repossessions by creditors, which are recorded as financial transactions).
- *Other volume changes in non-financial assets n.e.c.* - includes unforeseen obsolescence, degradation and damage not allowed for in consumption of fixed capital, abandonment of production facilities before they are brought into use, and exceptional losses in inventories (e.g. from fire, robbery or infestation).
- *Other volume changes in financial assets and liabilities n.e.c.* - includes allocation and cancellation of SDRs, write-offs or write-downs of bad debts by creditors, and changes in the actuarially-determined value of defined-benefit pension schemes.
- *Changes in classification and structure* - includes changes in the sector classification of units, monetisation and demonetisation of gold and other changes in the classification of assets and liabilities.

16.20 In the ASNA it has not been possible to cover all of the types of other volume changes described above and the value of other changes in the volume of assets sometimes is estimated as a residual.

# CHAPTER 17 THE BALANCE SHEET

## THE BALANCE SHEET

### The balance sheet

17.1 A balance sheet is defined in paragraph 13.2 of the 2008 SNA as follows:
"*A balance sheet is a statement, drawn up in respect of a particular point in time, of the values of assets owned and of the liabilities owed by an institutional unit or group of units. A balance sheet may be drawn up for institutional units, institutional sectors and the total economy.*"

17.2 The following provides details of the consolidated national and sectoral balance sheets. The balance sheet contains estimates of the value of some of Australia's natural resources as well as data on produced assets, and net financial claims on the rest of the world. The summary aggregate is net worth, which is defined as the difference between total assets and liabilities.

17.3 The balance sheet completes the sequence of accounts, showing the ultimate result of the entries in the production, distribution and use of income, and accumulation accounts.

#### Classification of assets in the balance sheet

17.4 According to the 2008 SNA, for an asset to be included in the national balance sheets it must be an economic asset:

- over which ownership rights are enforced by institutional units, individually or collectively; and
- from which economic benefits may be derived by its owner by holding it, or using it, over a period of time.

17.5 The 2008 SNA describes three types of assets that should be included in the national balance sheets:

- non-financial produced assets (paragraph 10.9 of the 2008 SNA):
*"Produced assets are non-financial assets that have come into existence as outputs from production processes that fall within the production boundary of SNA."*

- non-financial non-produced assets (paragraph 10.9 of the 2008 SNA):
"*Non-produced assets are non-financial assets that have come into existence in ways other than through processes of production.*"

- financial assets (and liabilities) ( paragraph 3.36 of the 2008 SNA):
"*Financial assets consist of all financial claims, shares or other equity in corporations plus gold bullion held by monetary authorities as a reserve asset.*"

17.6 The definitions of the assets in the balance sheet are consistent with the definitions of assets in the capital and financial accounts.

17.7 The balance sheet is shown in 2008 SNA as:

**NATIONAL BALANCE SHEET ACCOUNT**

| **ASSETS** | **LIABILITIES AND NET WORTH** |
|---|---|
| Non-financial assets | Liabilities to the rest of the world |
| Produced assets | Net worth |
| Fixed assets | |
| Inventories | |
| *Valuables(a)* | |
| Non-produced assets | |
| Natural resources | |
| Permissions to use natural resources | |
| Financial assets with the rest of the world | |
| **Total assets** | **Total liabilities and net worth** |
| **Memorandum Items** | |

(a) Currently not compiled in the ASNA.

17.8 The financial and non-financial resources at the disposal of an institutional unit or sector shown in the balance sheet provide an indicator of economic status. These resources are summarised in the balancing item, net worth. Net worth is defined as the value of all the assets owned by an institutional unit or sector less the value of all its outstanding liabilities (including share capital). It is important to note that net worth is a balancing item and can be negative, for example if loans owed are greater than the value of assets held.

Differences between 2008 SNA and ASNA in the asset boundary

17.9 The balance sheet estimates are generally consistent with 2008 SNA recommendations, although there is one main area where the ABS has not followed the recommendations of 2008 SNA with regard to the asset boundary. This relates to the types of subsoil assets valued in the balance sheet. Paragraph 12.17 of 2008 SNA defines subsoil assets as;

> "*proven subsoil resources of coal, oil and natural gas, metallic minerals or non-metallic minerals that are economically exploitable given current technology and relative prices.*"

17.10 The ASNA treatment of subsoil assets reflects the treatment adopted by Geoscience Australia for identifying Australia's mineral resources. In the ANSA, the volume of subsoil assets available for production is more accurately reflected by the term 'economically demonstrated resources' (EDR), which equates to proven plus probable resources. EDR are those resources that have a very high probability of existence and are economically feasible to extract, given current technology and relative prices.

17.11 Further, while 2008 SNA recommends that some assets such as valuables; water resources; goodwill and marketing assets; and contracts, leases and licences be included in national balance sheets, they are not recorded in the ASNA with the exception of spectrum licences. However, in principle the ASNA agrees that these assets should be included, though at present there are insufficient data to do so.

Valuation issues of the balance sheet

*General principles of valuation*

17.12 Ideally, assets should be valued on the basis of current, observable market prices as this is the basis on which decisions by producers, consumers, investors and other economic agents are made. In the ASNA and in the absence of observable market prices, current prices can be approximated for balance sheet purposes in two ways.

1. In some cases, market prices may be approximated by accumulating and revaluing acquisitions less disposals of the asset in question over its lifetime. This method has been used to value

estimates of produced fixed assets as well as estimates of the value of consumer durables (the latter appears as a memorandum item in the balance sheet).

2. In other cases, market prices may be approximated by the present, or discounted, value of future economic benefits expected from any given asset; this is the method used for subsoil assets and native forests in the balance sheets.

*Non-financial produced assets*

17.13 The principles of valuing produced non-financial assets (excluding plantation standing timber) in the balance sheet are consistent with the valuations in the ASNA capital account. These are mostly consistent with the approaches as recommended by the 2008 SNA.

17.14 The value of non-financial produced fixed assets and intellectual property products are calculated using the Perpetual inventory model (PIM). The end-year net capital stock for each type of asset is included in the balance sheet. The value of changes in inventories by sector type is obtained from the capital account.

Plantation standing timber

17.15 Standing timber assets include plantation and native forests (see section on Non-financial non-produced assets). The 2008 SNA does not specifically identify the types of standing timber to be included in the national balance sheets other than that the forests must be owned by an institutional unit and must bring economic benefits to their owners. All publicly owned forests outside conservation reserves and all private forests in Australia are potentially available for timber production, either now or at some time in the future, although a number of constraints reduce the area of forest available for production.

17.16 Standing timber other than that recommended for inclusion in national balance sheets may also have an economic value according to 2008 SNA. For instance, conservation forests with timber values include national parks, wilderness areas, water catchment areas and those inscribed on the World Heritage List, such as the Lord Howe Island Group. Although these forests contain commercially viable timber, logging is prohibited so the ASNA does not include this potential timber value in its balance sheet estimates.

17.17 Forests also have a range of non-timber values, such as maintaining biodiversity, acting as a carbon sink, and preventing soil erosion. However, valuing these attributes is not within the scope of the ASNA balance sheet estimates.

17.18 As with subsoil assets, market transactions for forests are not common. For plantations, insurance values by tree age are considered to be an appropriate proxy for market values. These insurance schedules are determined by the Australian Forest Growers' Association. Data on plantation forest area and plantings currently comes from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) annual publication *National Plantation Inventory.* Prior to 1975, annual planting data was not available, and so annual plantings had to be estimated based on annual increases in total plantation area in each year up to 1975.

17.19 The estimates of the value of Australia's plantation timber resources are based on the estimated net area of forest available for production in each State and Territory. The valuation method for the different types of plantation standing timber is in line with the recommendations of 2008 SNA. Harvestings are calculated as the difference between the total plantation area and the sum of the annual plantings, over the insurance schedule. The following provides the valuations used for the two types of plantation standing timber:

- Coniferous plantations - are valued using an insurance schedule provided by the insurance industry. The schedule shows the value of each hectare from 1 to 30 years of age (35 for South Australia).
- Broadleaved plantations - are also valued using insurance schedules showing the insured value of each hectare of forest according to tree age (up to 20 years).

17.20 This approach does not fully account for net depletions in plantations due to drought, disease, land use change, fire or other natural causes. Where a forest is harvested sustainably, no depletion adjustment is required.

*Non-financial non-produced assets*

17.21 The following provides details on the valuation of non-financial non-produced assets, which are primarily calculated for the balance sheet.

Land

17.22 Land is defined in the 2008 SNA (paragraph 10.175) as:

"*the ground, including the soil covering and any associated surface waters*".

17.23 Excluded are any buildings or other produced structures situated on it (e.g. cultivated crops, trees and livestock; subsoil assets; non-cultivated biological resources and water resources). Estimates for the value of land in the balance sheets include freehold and leasehold land in private hands, plus land owned by Commonwealth, State and Territory, and local governments and their business enterprises.

17.24 In principle, the value of land excludes the value of improvements and buildings which fall into the scope of fixed assets. Land is valued at its current price paid by a new owner, excluding the costs of ownership transfer which are treated, by convention, as gross fixed capital formation (GFCF) and are subject to consumption of fixed capital (COFC). Because the current market value of land can vary considerably according to its location and the uses for which it is suitable or sanctioned, it is essential to identify the location and use of a specific piece or tract of land in order to price it accordingly.

17.25 When the value of land cannot be separated from the building, structure, or plantation, vineyard, etc. above it, the composite asset should be classified in the category representing the greater part of its value. Similarly, if the value of the land improvements (which include site clearance, preparation for the erection of buildings or planting crops and costs of ownership transfer) cannot be separated from the value of land in its natural state, the value of the land may be allocated to one category or the other depending on which is assumed to represent the greater part of the value.

17.26 Estimates of land values are supplied to the ASNA from each of the State and Territory Valuers'-General. Commercial and rural land estimates are identical to the data provided by the Valuers'-Generals. These estimates are on a consistent basis with those supplied to the Commonwealth Grants Commission, i.e. they represent the site value of land and are classified according to land purpose. Valuers'-General value land at market prices and in practice there are a number of difficulties in applying observed prices to the whole of the land stock. Estimates for commercial land are allocated to the following sectors – non-financial corporations, financial corporations and households. Rural land is allocated to the household and non-financial corporations sectors. Land estimates for the general government sector are sourced directly from Government Finance Statistics (GFS).

17.27 For residential land, the ASNA uses data compiled by the Reserve Bank of Australia (RBA) on the value of residential dwelling stock (which includes the value of land) less the capital estimate of the value of dwellings owned by households. This is to ensure that the ASNA estimates are consistent with data published by the RBA in its '*Statistical Tables*'. Residential data provided by each State and Territory Valuers-General is used to create state proportions of the RBA published total. The RBA estimates on a quarterly basis the combined value of residential land and the dwellings owned by the household sector by applying sales data to ABS Census of Population and Housing data. Estimates exclude vacant residential land owned by households.

Subsoil assets

17.28 Subsoil assets are defined in 2008 SNA 12.17 to consist of

"*Subsoil resources of coal, oil and natural gas, metallic minerals or non-metallic minerals that are economically exploitable given current technology and relative prices.*"

17.29 Estimates of the economically demonstrated reserves (EDRs) and production of mineral resources in Australia are published annually by Geoscience Australia in *Australia's Identified Mineral Resources* and *Oil and Gas Resources of Australia.* Production costs are provided by a private consulting firm and are derived using company reported financial information from a sample set of mines and industry trends. Prices are derived from a number of publically available resources, including the *Australian Financial Review* and the Bureau of Resources and Energy Economics' quarterly publication *Resources and Energy Statistics.*

17.30 As there are insufficient transactions in subsoil assets in Australia to determine market prices for these assets, the ASNA has used the net present value (NPV) approach. Given the data constraints, this is considered to provide more reliable estimates than alternative approaches.

17.31 The NPV approach involves calculating the expected future net income flow generated by the asset, then discounts this value by an appropriate interest rate over the expected life of the asset. This involves estimating the value of net income; gross output (price multiplied by production) less costs (including a normal return on produced capital) over a year. This difference is taken to be the equivalent of economic rent. The future income flow has been calculated for each year and is discounted over the expected mine life to obtain a value in today's dollars. The ASNA uses a five-year lagged average to smooth prices, costs and production.

17.32 Normal returns to produced capital are not included in economic rent as it represents the returns from the resource only (and not returns on produced capital used to extract the resource). 'Normal' returns on capital should include a reward to cover the cost of risk and uncertainty in exploration and development, and an overall long-term risk premium to cover price volatility and the general level of inflation. Data on normal returns to produced capital are derived by the ASNA using ASNA capital stock estimates, an appropriate discount rate and extraction costs.

17.33 In the derivation of real (inflation adjusted) discount rates, the ASNA has assumed that a company's decision to commit resources (towards exploration and extraction) is significantly influenced by costs of borrowing. Consequently, the discount rate chosen has been aimed at reflecting the cost of capital, or the cost of borrowing, to the mining industry. Moreover, because the future stream of income is expressed in current dollar terms, a real (as opposed to a nominal) rate of discount is appropriate as the future income flow is calculated on the basis of current income and costs.

Native Standing Timber

17.34 Standing timber assets cover both native and plantation forests (see section on Non-financial produced assets). As mentioned under plantation standing timber, the scope of timber assets includes forests (excluding conservational) potentially available for timber production, either now or at some time in the future. Other non-timber values (such as biodiversity) are not within the scope of the national balance sheets as discussed in the section on Plantation standing timber.

17.35 Data for estimating the value and proportion of private timber production, harvesting of native forests, and average rotation cycles, have been obtained from the ABARES' half-yearly publication *Australian Forest and Wood Products Statistics.* Each State and Territories forestry department provides annual data on revenue earned from sales of harvested native timber under public ownership. Due to confidentiality, some state estimates are not published separately.

17.36 Native standing timber is valued differently from plantation forests as there is no suitable market price data available, proxies or otherwise. Accordingly, the ASNA has used the NPV of the future stream of royalty income (on the assumption that royalties approximate economic rent) to value native standing timber.

17.37 The estimates of the value of Australia's native timber resources are based on the estimated net area of forest available for production in each State and Territory. The valuation method for native standing timber is in line with the recommendations of 2008 SNA. The ASNA has valued native forests using the NPV method. The ASNA has valued native standing timber using a net value-of-production approach over the estimated rotation cycle of the forests. The ASNA chose the cost of borrowing to the forest industry to represent the forest industry's nominal discount rate. The ASNA estimated the cost of borrowing by deriving a five-year lagged average of the Reserve Bank of Australia's average indicator rate for large business loans, published in its *'Statistical Tables'*. To derive a real rate of discount, the ASNA has constructed an index reflecting changes in prices of forest industry inputs.

Radio spectrum and spectrum licences

17.38 The radio spectrum is an asset that is recognised as being of economic value from the time at which a licence to use it is issued. There is no specific definition for spectrum in 2008 SNA, however spectrum licences fall under contracts, leases and licences (outlined in paragraph 13.52 and described in more detail in chapter 17 of the 2008 SNA).

17.39 Data on the value of auctions of spectrum licences comes from the Australian Communications and Media Authority. These data are used to estimate a value for spectrum and the permission to use the natural resource, spectrum licences.

17.40 The value of the spectrum is based on the net present value method, i.e. valuation involves estimating the discounted future stream of income that the asset is expected to generate beyond the life of the licence. The value of the spectrum licence is linked to an auction price.

17.41 Note the value of the spectrum is also linked to the licence price but may be higher due to a longer expected asset life. However, an offset is required in the accounts to limit the total value that is added to net worth. In effect, the sum of the value of the two assets cannot be greater than the value of the spectrum. In practice this requires that the initial value of the spectrum be reduced by the purchase value of the licence. However, over time as the licence declines in value, and assuming no change in the overall value of the spectrum, a transfer of value between the licence and the spectrum will be recorded to ensure that overall net worth is unaffected. To the extent that market conditions and expectations change following the issue of the licence the value of both the spectrum and the licence may change. All these transactions and changes are reflected in the other changes in volume of assets account.

*Financial assets and liabilities*

17.42 The principles of valuing financial assets and liabilities in the balance sheet are consistent with the valuations in the financial account. Values for financial assets and liabilities are obtained from *Australian National Accounts: Financial Accounts* (cat. no. 5232.0). These are mostly consistent with the approaches as recommended by 2008 SNA. For further discussion on financial accounts and financial balance sheets refer to Chapter 15.

## Volume/real measures for national balance sheet

17.43 The national balance sheet is also presented in volume/real terms. Chain volume measures for the balance sheet values for produced non-financial assets are compiled in the perpetual inventory model (PIM) and published in the capital stock tables in both current prices and as chain volume measures. Volume estimates have also been developed for the non-produced non-financial assets presented in the national balance sheet.

17.44 Financial assets and liabilities cannot be decomposed into price and volume components, so it is impossible to derive volume indexes for them. However, it is possible to deflate income flows, and financial assets and liabilities by a price index in order to measure the purchasing power of the aggregate in question over a designated numeraire set of goods and services. Such measures are called "real" estimates.

17.45 Real net worth is derived by aggregating the chain volume estimates of the non-financial assets with the real estimates of financial assets less liabilities using the standard method of chain aggregation.

*Sources and methods*

17.46 Chain volume measures for produced assets are derived using the concepts, sources and methods outlined in Chapter 10. Chain volume measures for subsoil assets and native standing timber can be obtained as an extension of the process used to compile the current price estimates for these aggregates, as explicit price and volume information underlie the compilation of the current price estimates in the balance sheet. Effectively, unit resource rents and discount rates are kept constant to produce the volume estimates for these assets. For spectrum and spectrum licences, volume estimates are calculated by deflating the current price values using the domestic final demand implicit price deflator.

17.47 Deriving chain volume measures of land raises a number of important issues. Can the volume of land change over time, or is change in its value wholly due to price change? The land area of a nation does not change very much in the normal course of events. However, as volume change is also defined to include changes in quality, it seems clear that the volume of land can change due to natural processes, soil conservation and other land improvement measures, and by land degradation and other human activity. Urban land is more economically valuable than rural land because of the higher utility provided to urban dwellers. As urban boundaries expand and land is rezoned for urban use, it can therefore be argued that the volume of the resource changes because it is now available for higher value uses. Location is critical in determining the quality, and hence the volume, of land. For this reason land in a central business district can be said to be of a higher quality than land in the suburbs of a city, and is subject to more intensive development. The volume estimates for land are therefore compiled by assuming that land volumes do change over time. In practice it is difficult to distinguish between price and volume changes for land. Consequently, the growth in the volume of land has been estimated by assuming that the volume of urban land grows at half the rate of growth in the volume of the overlying non-dwelling construction and at one-third of the rate of growth in the volume of overlying dwelling construction. Rural land is estimated to have zero volume growth, which assumes that rural land degradation, land improvement and rezoning net to zero.

17.48 Real estimates of financial assets and liabilities are derived by deflating their current price values using the domestic final demand implicit price deflator.

### RELIABILITY OF THE ESTIMATES OF NATURAL RESOURCES

17.49 In order to derive estimates of net worth, natural resources have been valued in monetary terms to provide a common basis for aggregation of all assets. However, the valuation of natural resources and permission to use natural resources are still very much in their infancy, and the values should be interpreted with caution and used in conjunction with the physical stock data. When doing so, it must be borne in mind that the physical estimates are also subject to some uncertainty regarding the total resources which will ultimately become available for production.

17.50 The 2008 SNA acknowledges that valuation of expected net returns, resulting from the commercial exploitation of natural resources, is subject to great uncertainty and to possible considerable revision. It points out that, as ownership of these assets does not change frequently on markets, it is difficult to obtain appropriate market prices to use for valuation purposes, so that in practice it may be necessary to use the valuations which the owners of the assets place on them in their own accounts (the 2008 SNA, paragraph 13.49). As such data are not available in Australia, it is necessary for the ASNA to calculate the net present value of these resources.

17.51 Given the way that the experimental estimates of non-produced non-financial assets are derived, only a very small proportion of the total resource is accounted for at any one time, and valuation can give a misleading impression of the size of the resource base. Monetary estimates are subject to considerable volatility, and accordingly can give a deceptively optimistic or pessimistic picture. Hence, the estimates must be viewed with some caution.

17.52 While these estimates are still experimental, the ASNA has consulted with a range of industry participants and related departments in an attempt to improve its estimates. The ASNA is also involved in international conferences and discussion groups which have been convened with the objective of developing the most appropriate approach.

## Sectoral estimates

17.53 A sectoral breakdown of the national balance sheet is also provided. The ASNA identifies four domestic institutional sectors within the economy; the household sector (which includes unincorporated enterprises and NPISHs), general government, financial corporations and non-financial corporations. Transactor units are assigned to a sector according to their functional role in the economy.

17.54 The sectoral split is based on a variety of sources including published and unpublished ASNA data, taxation statistics, and data from the State and Territory Valuers'-General. The sectoral estimates for non-produced assets are experimental due to inadequate data sources and are derived using fixed ratios or related data as an indicator of sector ownership.

### MEMORANDUM ITEMS

17.55 Memorandum items are included in the national balance sheets to show items not separately listed as assets, but are of particular interest to institutional sectors.

Consumer durables

17.56 Paragraph 9.42 of the 2008 SNA defines a consumer durable as

> "*A good that may be used for purposes of consumption repeatedly or continuously over a period of a year or more*".

17.57 Households acquire durable goods, such as cars and electrical goods. These are not considered fixed assets and are not included in the calculation of net worth as they are not used in the production process that gives rise to household services. However, as they are assets consumed over a long period of time, it is useful to have data on these types of goods and so they are included as a memorandum item in the national balance sheets.

17.58 Consumer durables include motor vehicles; furniture and floor coverings; household appliances; tools and equipment for house and garden; audio and visual equipment; other durable goods for recreation and culture; jewellery, clocks and watches; and therapeutical medical appliances.

17.59 The current price estimates and price indexes are obtained from *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) estimates for household final consumption expenditure. Estimates for asset lives, consumption of fixed capital and retirement patterns are obtained from Katz, Arnold J., and Herman, Shelby W., (1997), *'Improved Estimates of Fixed Reproducible Tangible Wealth, 1929-95'.*

17.60 Consumer durables are valued using the perpetual inventory model (PIM). Period to period investment is added to the consumer durables stock and retired assets and consumption of fixed capital are deducted.

Direct Investment

17.61 It is analytically useful to have data on the stock of investment in Australia by non-residents and the stock of investment abroad by residents. These data come from *Balance of Payments and International Investment Position, Australia* (cat. no. 5302.0).

## USES OF THE BALANCE SHEET

17.62 The monetary estimates of natural resources contained in the balance sheet are underpinned by a dataset of physical estimates detailing levels of particular natural resources. Due to the experimental nature of the monetary estimates, it is considered that monetary estimates of natural resources should be considered in conjunction with the physical estimates, especially for subsoil assets and permission to use natural resources. The estimates provide information for monitoring the availability and exploitation of these resources and for assisting in the formulation of environmental policies.

17.63 Data on the level and composition of assets and liabilities indicate the economic resources of, and claims on, a nation and are inputs to assessments of the nation's external debtor or creditor position.

17.64 Sectoral balance sheets provide information necessary for analysing a number of topics. Examples include determining household spending behaviour and liquidity and the computation of widely used ratios, such as assets to liabilities, net worth to total liabilities, non-financial to financial assets, and debt to income. The level of household saving and the household saving ratio in Australia are important analytical aggregates. Sector balance sheets provide additional information on the relationship between consumption and saving behaviour.

# CHAPTER 18 EXTERNAL ACCOUNT

## EXTERNAL ACCOUNT

18.1 All current transactions between Australian residents and non-residents are recorded in the external income account. The income of non-residents includes Australia's imports of goods and services, compensation payable to non-resident employees, property income receivable from Australia and other current transfers from Australia. The use of income side shows Australia's exports of goods and services, compensation payable by non-residents to Australian employees, property income payable to Australia and other current transfers to Australia. The balance on the external income account represents net lending to non-residents: positive net lending to non-residents corresponds to a surplus on current transactions and negative net lending corresponds to a deficit. Aside from some presentation differences, the external income account shown in the national accounts is the same as the current account in balance of payments statistics. Therefore, for more detail on the compilation of the external account refer to the *Balance of Payments and International Investment Position, Australia: Concepts, Sources and Methods* (cat. no. 5331.0) .

18.2 The external capital account shows, on one side, the balance on external current transactions (from the external income account) and net capital transfers receivable from Australian residents. On the other side, net acquisitions of non-produced non-financial assets by non-residents are shown. The balance is net lending from non-residents to Australia.

18.3 The external financial account records all transactions in financial assets between Australian residents and the rest of the world. The balancing item in the external financial account (that is, net acquisition of financial assets less net incurrence of financial liabilities) is conceptually equal to the balancing item in the external capital account. However, in practice a statistical discrepancy is required to achieve balance.

18.4 The external balance sheet records Australian residents' assets in the rest of the world and non-residents' assets in Australia. The balancing item is Australia's net international investment position, which is a component of Australia's net worth.

# CHAPTER 19 PRODUCTIVITY MEASURES

## INTRODUCTION

19.1 The ABS produces annual indexes of labour and multifactor productivity (MFP) for the market sector as well as for each industry division within the market sector. The ABS also produces quarterly estimates of labour productivity (i.e. GDP per hour worked) for the market sector and for the whole economy, and quarterly and annual GDP per capita. The annual productivity measures for the market sector are published in *Australian System of National Accounts* (cat. no. 5204.0), the quarterly indexes of GDP per hour worked are published in *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0), and the annual industry level MFP indexes are published in *Experimental Estimates of Industry Multifactor Productivity* (cat. 5260.0.55.002).

19.2 Productivity is typically measured as output divided by input, that is, as output per unit of input. Partial measures of productivity take into consideration a single input like labour or capital. Labour productivity is frequently used as an indicator of productivity growth, which is simply measured as output per hour worked. When multiple inputs such as labour and capital are taken into consideration, it is called multifactor productivity (MFP), which is measured as output per unit of a combined bundle of labour and capital.

19.3 Of specific interest to economists are the underlying causes of economic growth. Typically, single indexes are not sufficient for this purpose. Labour productivity indexes reflect not only the contribution of labour to changes in production per labour unit, but are also influenced by the contribution of capital and other factors affecting production such as technological change. In comparison, MFP measures offer more comprehensive explanations to the sources of output growth. Specifically, MFP statistics are designed to inform how much economic growth originates from productivity growth (increased outputs from the same quantity of inputs) and how much from increased inputs (increased outputs from more capital goods or additional working hours). It is MFP therefore that is most commonly used in rigorous productivity analysis.

19.4 The MFP measures are compiled in the standard growth accounting framework, which originates from the neoclassical theory of economic growth formulated by Solow[35]. In the original Solow growth accounting framework, the stock of capital was used as a measure of capital input, and labour input was measured as hours worked without accounting for compositional changes in the labour force.[36] Using his traditional growth accounting framework, Solow attributed almost all of the U.S. economic growth to the productivity growth, measured as the well-known *Solow residual*.

19.5 In comparison, the modern growth accounting framework is characterised by incorporation of quality changes into the measurement of capital and labour input.[37] The major cornerstone underlying this development was the introduction of *constant quality* indexes of capital and labour inputs by Griliches and Jorgenson[38] and Jorgenson, Gollop & Fraumeni[39]. Within the modern growth accounting framework, a substantial fraction of the Solow residual (technical progress) can be explained by changes in the quality of inputs. The part of technical progress captured in constant quality of input indexes is referred to as *embodied* technical progress, while disembodied technical progress relates to spill-over effects through diffusion of advances in science and technology, which is beyond the input measurement. In this context, productivity growth (technical progress) within the modern growth accounting framework is interpreted as disembodied technical progress. According to the modern growth accounting analysis, economic growth is largely driven by input growth and (disembodied) technical progress contributes only a small proportion.

19.6 To assist official statistical agencies to compile MFP statistics employing the growth accounting framework, the OECD has produced a number of handbooks and manuals to set out a guide for 'best practice' in

[35] Solow, Robert M. "Technical Change and the Aggregate Production Function." *Review of Economics and Statistics*, 39, August 1957, 312-320

[36] Solow (1957) noted that 'Ideally what one would like to measure is the annual flow of capital services (p. 314)'. He also recognised the importance of labour quality growth in the growth accounting framework. Due to lack of data, he had to end up with crude measures of capital and labour.

[37] Another radical departure from the traditional growth accounting framework includes output measurement and aggregating methodology, as discussed in Jorgenson, Ho & Stiroh (2005).

[38] Griliches, Zvi and Jorgenson, Dale W. "Sources of Measured Productivity Change: Capital Input." American Economic Review, 56. May 1966, 50-61

[39] Jorgenson, Dale W., Frank M. Gollop, and Barbara M. Fraumeni, *Productivity and U.S. Economic Growth*. Cambridge, MA: Harvard University Press, 1987

productivity measurement by statistical agencies[40]. The ABS was a major contributor to the development of the OECD Capital Manual[41], which is an important document for guiding practitioners on how to measure the capital services component of productivity measures.

19.7 The methods used by the ABS in compiling productivity statistics align with international best practice as implemented by most OECD countries. The ABS MFP statistics are compiled on the basis of the standard growth accounting framework, which is widely adopted by leading statistical agencies and recommended by the OECD.

19.8 In 1989 ABS first released its experimental MFP estimates in the *Information Paper: Development of Multifactor Productivity Estimates for Australia 1974-75 to 1987-88* (cat. no. 5229.0). In 1990, the detailed technical issues in relation to those preliminary MFP estimates were covered in *Occasional Paper: Estimates of Multifactor Productivity Australia* (cat. no. 5233.0). Estimates of MFP were first included in *Australian National Accounts Multifactor Productivity* (cat. no. 5234.0) released in June 1994. From 1999, the aggregate MFP statistics were incorporated into the *Australian System of National Accounts* (cat. no. 5204.0).

19.9 The availability of supply and use tables since 1995 makes it possible to compile industry level MFP statistics. The ABS started to compile and release industry level MFP statistics data cube since 2007 (cat. no. 5260.0.55.002). This data cube provides experimental MFP estimates for individual industries in the Australian economy. This data cube includes measures of input, output and MFP at the industry level from 1985-86 onwards for 12 industries, with the remaining market sector industries commencing in 1994-95. It goes beneath the aggregate economy to measure the productivity of individual industries.

## CONCEPTS

### Labour productivity

19.10 Labour productivity is defined as a ratio of some measure of output to labour input, that is, output per unit of labour. Labour productivity is usually expressed in terms of growth rate.

19.11 Labour productivity is widely used for making historical, inter-industry and inter-country growth comparisons. Furthermore, labour productivity is often regarded as an indicator of improvements in living standards as growth in labour productivity has a close long term relationship with growth in labour earnings.

19.12 Labour productivity has a close relationship to multifactor productivity. In the growth accounting framework, growth in labour productivity can be decomposed into growth in capital deepening (the ratio of capital to labour), growth in labour quality and growth in MFP. More detail is provided in Annex 19B.

### Capital productivity and capital deepening

19.13 Capital productivity is defined as a ratio of some measure of output to capital input, that is, output per unit of capital. Obviously, changes in this ratio can also reflect technological changes and changes in other factor inputs (such as labour).

19.14 The measure of capital input used by the ABS in its estimates of capital productivity is the flow of capital services coming from the stock of capital and most assets are estimated using the Perpetual Inventory Method (PIM). They are calculated by weighting chain volume measures of the productive capital stock of different asset types together using their rental prices in the weights. Rental prices can be regarded as the 'wages' of capital.

19.15 Capital deepening (or capital intensity) refers to changes in the capital to labour ratio. Increased capital deepening means that, on average, each unit of labour has more capital to work with to produce output, so is an indicator of ability to augment labour. Labour saving practices, such as automation of production will result in increased capital deepening, which is often associated with a decline in capital productivity. Thus growth in capital deepening is an important driver (alongside MFP) of labour productivity growth. It follows

[40] Organization for Economic Co-operation and Development (OECD), *OECD Productivity Manual: A Guide to the Measurement of Industry Level and Aggregate Productivity Growth*. Paris, 2001
[41] Organization for Economic Co-operation and Development (OECD), *Measuring Capital OECD Manual*, Second Edition. Paris, 2009

that since declines in capital productivity can be more than offset by labour productivity (resulting in MFP growth), it may not be very useful to interpret declines in capital productivity in isolation.

### Multifactor productivity

19.16 MFP is defined as a ratio of some measure of output to a combined input of multiple factors, such as labour and capital. In empirical analyses, MFP is expressed in terms of growth rate, that is, growth rate of output minus the growth rate of inputs.

19.17 At the aggregate and industry level, MFP is defined as the ratio of real value added to the combined inputs of capital and labour. At an industry level, MFP is also measured as the ratio of gross output to the combined inputs of capital, labour, and intermediate inputs.

19.18 In the productivity measurement literature, gross output based MFP is a preferred measure at a disaggregate level, as it requires less restrictive assumptions (see Jorgenson *et. al* 2005 and Diewert[42]). Ideally MFP measures disembodied technical change attributable to improved use of factor inputs. In the case of gross output this efficiency can be attributed to improvements in not only the use of primary inputs, capital and labour, but also in the use of intermediate inputs.

### Measured productivity and technical progress

19.19 It is useful to distinguish between measured productivity and technical progress in productivity analysis. Productivity statistics aim to measure technical progress or the efficiency of production. In practice they measure the difference between the growth in the volume of output and the growth in the volume of inputs, which reflects more than just technical progress including: economies of scale, reallocation of inputs, changes in human capital, variations in capacity utilisation, climatic events, and measurement error. Year-to-year changes also contain 'noise' that is distinct from the notion of technical progress and therefore it is advisable to examine productivity changes over an extended period to look through some of the short-term volatility.

### Productivity growth cycles

19.20 The growth accounts are most useful when presented over productivity growth cycles. MFP growth cycles are defined as periods between selected peak deviations of annual MFP from their corresponding long-term trend estimates. The long-term trend is estimated using a Henderson 11 term moving average. For the Australian economy, examining MFP movements over growth cycles is a common approach for interpreting productivity performance over time. The purpose is to minimise the effects of cyclical factors that may cause the year-to-year changes in MFP to deviate from its conceptual definition. By averaging between peaks it is assumed that these peaks represent similar levels of capacity utilisation, allowing more like-for-like comparisons of MFP between different growth cycles.

[42] Diewert, Erwin, OECD Workshops on Productivity Measurement and Analysis: Conclusions and Future Directions, in Productivity Measurement and Analysis: Proceedings from OECD Workshops, 2008

DATA SOURCES AND METHODS

## The scope of measurement

19.21 The growth accounting framework is initially developed for measuring productivity in the private sector of the economy. As such, MFP statistics relate to selected industries rather than the whole economy. Ideally, MFP measures should cover all market economic activities, but this is only possible if all of the necessary data are available.

19.22 For this reason, official MFP estimates internationally are confined to particular industries in the private sector, with varying degrees of coverage depending on data suitability and availability. Statistics Canada terms their coverage as the *business sector,* and Statistics New Zealand labels their coverage as the *measured sector*. In Australia, the ABS labels the relevant group of industries as the *market sector*. This grouping is used to present economic statistics including MFP estimates in the *Australian System of National Accounts* (cat. no. 5204.0).

### The market sector

19.23 The *market* comprises 16 industries under the Australian and New Zealand Standard Industrial Classification 2006 (ANZSIC06), that is, from ANZSIC06 Divisions A to N, plus Divisions R and S. The detailed industries included in the market sector are as follows:

| ANZSIC Division | Industry |
|---|---|
| A | Agriculture, Forestry and Fishing |
| B | Mining |
| C | Manufacturing |
| D | Electricity, Gas, Water and Waste Services |
| E | Construction |
| F | Wholesale Trade |
| G | Retail Trade |
| H | Accommodation and Food Services |
| I | Transport, Postal and Warehousing |
| J | Information, Media and Telecommunications |
| K | Financial and Insurance Services |
| L | Rental, Hiring and Real Estate Services |
| M | Professional, Scientific and Technical Services |
| N | Administrative and Support Services |
| R | Arts and Recreation Services |
| S | Other Services |

19.24 Until recently the *market sector* consisted of 12 industries (divisions A to K and P of Australian and New Zealand Standard Industrial Classification 1993 (ANZSIC93)). The ABS has recently expanded the scope of the *market sector* to include four new services industries. The expanded definition improves relevance in two key respects: it reflects the growing influence of services industries in the economy; and improves economic coverage.[43]

19.25 While the new definition of market sector results in much improved coverage of the total Australian economy, the time span available for constructing meaningful productivity indicators is shortened. Productivity measures for the expanded coverage commence in 1994-95, when suitable output measures for the newly added industries become available. Prior to 1994-95, volume estimates of gross value added in Divisions L, M, N and S were derived (in part) using input indicators (such as hours worked).

19.26 Since the 2009-10 issue of ASNA, the ABS MFP statistics are presented in line with the new definition of the *market sector*. As such, these productivity measures are based on significant changes in coverage and do not

[43] As at 2010-11, the market sector represented approximately 80 per cent of total chain volume gross value added at basic prices. By comparison, the 12 selected industries aggregate represented approximately 60%.

represent updated estimates to past releases. The current estimates are not directly comparable to those published in past releases due to significant changes in coverage.

### 12 selected industries

19.27 While the expanded definition of the market sector results in much improved coverage of the total Australian economy, the time span available for constructing meaningful productivity indicators is shortened. To accommodate user requirements for longer time series of MFP statistics, ABS continues to compile aggregate MFP statistics for the group of 12 selected ANZSIC06 industries (divisions A to K and R). Commencing 1973-74, this aggregate is the nearest approximation to the earlier definition of the market sector grouping under ANZSIC93 and is useful for analysing productivity performance from the perspective of a longer time series.

19.28 Both the market sector and 12 selected industries include all institutional sectors, including general government attributable to those industries. Conceptually, there is a strong justification for netting out the general government component of each industry because general government activity is mainly not marketed. However, it has been left in because of the difficulty of excluding general government components from outputs and inputs. In any case, general government only accounts for a very small portion of most market sector industries.

### The non-market sector

19.29 The industries included in the 'non-market sector' are:

- Public administration and safety;
- Education and training;
- Health care and social assistance; and
- Ownership of dwellings.

19.30 The production of these government dominated industries largely comprises those goods and services which fall within the production boundary of the national accounts but are not for sale, or not sold at full market prices. For example, the provision of government services which relate to the community as a whole or for which no charge (or a purely nominal charge) is made. Ownership of dwellings is excluded from the market sector because no employment is associated with it.

19.31 Aggregate measures of labour productivity (gross value added per hour worked) are published for the total of all industries (including the non-market sector); for the market sector; and for 12 selected industries. Indexes of gross value added per hour worked are also available for each individual industry, including those industries in the market sector.

## The measurement of output

19.32 By the SNA definition, output consists of those goods and services that are produced within an establishment (or plant) that become available for use outside establishment, plus any goods and services produced for own final use. This definition of output is equivalent to the gross output definition in the productivity measurement.

19.33 The gross output definition is preferred because it is a natural output concept[44] and consistent with the traditional production theory which links output to primary as well as intermediate inputs. Hulten[45] argues that gross output 'is the correct concept for measuring the structure of production '.

19.34 To facilitate the comparisons of productivity performance across different industries, a value added concept is developed in the productivity measurement. This definition is based on the assumption that the components of value added are separable from that of intermediate inputs. The assumption of value added output at the industry level also implies a specific way that productivity growth affects the usages of primary and intermediate inputs. [46]

19.35 At an aggregate level, the value added concept is more appropriate as it needs to remove inter-industry transfers in aggregating industry outputs to derive the total output of the component industries. In this context, the aggregate value added output definition does not contradict the gross output concept at the corresponding disaggregate level.

19.36 The implications of alternative output measures on the interpretation of MFP measures are discussed in paragraph 19.18.

19.37 There are three output measures in the ABS productivity statistics:

1. industry gross output;
2. industry value added; and
3. aggregate value added.

### Industry gross output

19.38 Gross output refers to the value of goods and services produced in the accounting period, including production that remains incomplete at the end of that accounting period. While this definition is straightforward for goods-producing industries, some clarification of treatment is useful for service industries such as Transport and Storage, Wholesale Trade and Retail Trade:

- The gross output of *transport services* is measured by the amounts receivable for transporting goods or persons. That is, the transporting from one location to another is a process of production and is referred to as a transport margin that adds to the quality from the same good as it changes location;
- The activity of *storage* relates to the "re-transporting" of goods from one point in time to another (as opposed to locations in the instance of transport services). So the increase in price due to storage reflects storage costs incurred as a production process;
- The main output of the *wholesale and retail trade* industries is the value of the service provided in selling goods (i.e. goods purchased and resold are not treated as part of intermediate consumption). The value of the service is equal to the trade margins realised on the goods sold.

19.39 The measurement of these services at basic prices is analogous to that for goods producing industries: output at basic prices is the value of the trade margins, including the value of any subsidies received, and excluding taxes on production of the service.

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[44]Balk, Bert M, "An Assumption-free Framework for Measuring Productivity Change", *The Review of Income and Wealth*, Series 56, June 2010.
[45] Hulten, Charles R., *Accounting for the Wealth of Nations: The Net versus Gross Output Controversy and its Ramifications*, Scand.J. of Economics 94, Supplement, 9-24, 1992.
[46]Bosworth, Barry P. and Jack E. Triplett, *Services Productivity in the United States: Griliches' Services Volume Revisited,* Washington, DC, Brookings Institute, 2003

19.40 Much of the gross output of finance and insurance industry needs to be estimated indirectly. In the ASNA, FISIM is an output of banks, other depository corporations, central borrowing authorities and securitisers. For banks and other depository corporations it is the sum of the imputed service charges for both borrowers and depositors while, for central borrowing authorities and securitisers, it is the sum of the imputed service charge for borrowers. Similarly, the value of the insurance service charge, which forms part of the output of insurance and pension funds, is estimated indirectly from the total receivables and payables of insurance enterprises, including the income accruing from the investment of technical reserves.

### Intermediate inputs

19.41 Intermediate inputs consist of the value of the goods and services consumed as inputs to the production process. The goods and services may be either transformed (e.g. flour may be transformed into bread) or completely consumed or used up (e.g. electricity and most services) in the process of producing outputs.

19.42 In addition to goods and services used directly in the production process, intermediate inputs include the value of all goods and services used as inputs into ancillary activities. Ancillary activities include purchasing, sales, marketing, accounting, data processing, transportation, storage, and security. The output of an ancillary activity is not intended for use outside of the enterprise.

### Industry value added

19.43 Industry value added is equal to the total value of gross outputs at basic prices less the total intermediate consumption at purchasers' prices.

19.44 A key development in the supply and use tables has been the wider practice of using the double deflation method, that is, real gross value added and real intermediate inputs are derived separately for most industries. By sourcing more specific price deflators, the approach enables improved volume estimation, particularly for intermediate inputs.

### Aggregate outputs

19.45 The aggregate output for the market sector (or 12 selected industries) is the sum of gross value added produced by the component industries at basic prices. Basic prices are the prices producers receive and exclude *taxes less subsidies on products*. This valuation is consistent with the recommendations of the *2001 OECD Manual - Measuring Productivity,* which states that

> *'From the perspective of productivity measurement, the choice of valuation should reflect the price that is most relevant for the producer's decision making; regarding both inputs and outputs. Therefore, it is suggested that output measures are best valued at basic prices.'*[47]

19.46 The basic price valuation aligns the concept of production with that of factor incomes which include other taxes less subsidies on production and imports. Since industry value added is also at basic prices, the industry shares of aggregate output to sum to unity. Moreover, valuation consistency is necessary for additive growth accounting between industry and aggregate productivity measures.

19.47 The aggregate output measure for calculating the economy wide labour productivity, i.e. GDP per hour worked, is valued at purchasers' prices, inclusive of taxes less subsidies on products.

[47] OECD, *2001 OECD Manual - Measuring Productivity*, page 77

### Data Sources

19.48 National accounts data constitute the source of output measures required by a variety of productivity measures. Output data for the annual MFP statistics are sourced from supply-use tables which are used as the key framework for balancing national accounts at the ABS. The industry gross output is the basic ingredient of output measures, as value added output measures are derived as the differences between gross outputs and intermediate inputs at the industry level and aggregate output measures are based on aggregating across relevant industries.

19.49 Chapter 9 describes the definitions of gross output, intermediate inputs and gross value added in detail, and Tables 9.1 to 9.32 outline the data sources and methods used in the estimation of each of these for each industry. For the years from 1994-95 up to the year previous to the latest year these estimates have been compiled using S-U tables and are in balance with the expenditure estimates. The main data source for non-financial corporations and non-profit institutions serving household in the annual benchmarks is the Annual Integrated Collection (AIC), the results of which are published in *Australian Industry* (cat. no. 8155.0).

## The measurement of capital input

19.50 The measurement of capital input is concerned with estimating the contribution of capital to the production process, that is, the flow of capital services from the capital stock used in the production process. Capital services have both quantity and price dimensions. The quantity of capital services represents hours a machine is used or months a building is occupied. The price dimension, called the *rental price*, represents an hourly rate for using the machine or a monthly rate for occupying a building.

### Productive capital stock and quantity of capital services

19.51 The quantity of capital services is estimated by assuming that capital services produced by an asset are proportional to the value of productive capital stock of the asset, that is

$$K_t = u_t PKS_t$$

where $K_t$ is the quantity of capital services, and $PKS_t$ is the productive capital stock and $u_t$ is the capacity utilization rate.

19.52 The capacity utilization rate is assumed to be constant over time. This assumption has two implications. First, as $u_t$ is constant and invariant to time, a change in the quantity of capital services delivered from any given capital asset is tantamount to a change in its productive capital stock. Second, variations in the utilization of the capital stock are not accounted for in the estimation of its capital services, and as a consequence changes in the capital services over time may reflect the impact of short-term business cycles, other than movements of capital input.

19.53 The productive capital stock estimates are derived from data on gross fixed capital formation (except inventories and land), using the PIM. The essence of this method is to transform all capital assets of different vintages into equivalent efficiency units and then add them up into an estimate of the productive capital stock. Chapter 14 provides a full description of the procedures used to derive the productive capital stock. Chapter 10 provides a full description of the data sources and procedures used to compile estimates of gross fixed capital formation.

### Imputing rental prices

19.54 In estimating the value of labour services, statisticians can directly observe labour rental prices as wage rates paid to workers. In the case of capital however, the rental prices for capital have to be imputed. The rental price reflects the price at which an investor is indifferent between two alternatives:

1. earning a nominal rate of return on a different investment; and
2. buying a capital asset, renting it out, collecting rent and selling it in the next period.

19.55 A standard specification for the capital rental price in the absence of taxes is the arbitrage equation (Jorgenson, Ho and Stiroh, 2005):

$$P_{j,t-1}(1 + i_t) = r_{j,t} + (1 - \delta_j)P_{j,t} \qquad (19.1)$$

where $i_t$ is the nominal interest, $P_{j,t-1}$ is the acquisition price of capital asset $j$ at the beginning of the period, $r_{j,t}$ is the rental price, $P_{j,t}$ is the price of capital asset $j$ at the end of the period and $\delta_j$ is the rate of economic depreciation.

19.56 This can be rearranged into the expression:

$$r_{j,t} = i_t P_{j,t-1} + \delta_j P_{j,t} - \pi_{j,t} \qquad (19.2)$$

Where $\pi_{j,t} = P_{j,t} - P_{j,t-1}$ is the asset-specific capital gains term.

19.57 Equation (19.2) shows that the capital rental price consists of three components: the rate of return to capital, the depreciation rate and the capital gain or loss due to revaluation. The industry dimension is supressed here.

19.58 When tax considerations are given to the measurement of capital rental prices (both capital income taxes and indirect business taxes), the tax-adjusted rental price equation becomes:

$$r_{i,j,t} = T_{i,j,t}\left(i_{i,t}P_{i,j,t-1} + \delta_j P_{i,j,t} - \pi_{i,j,t}\right) + x_{i,t}P_{i,j,t-1} \qquad (19.3)$$

where $i$ indexes industries, $T_{i,j,t}$ is the income tax parameter and is the effective net indirect tax rate on production. The description of data sources for constructing the tax parameter is provided in Annex C.

19.59 The rate of return to capital $i_t$ can be estimated by either endogenously or exogenously. Under the endogenous approach, the total value of capital services in each industry is assumed to be equal to the compensation for all assets in that industry. The resulting internal rate of return exhausts capital income and is consistent with constant returns to scale. The nominal rate of return is the same for all assets in an industry, but may vary across industries.

19.60 In the case of the exogenous approach, the nominal rate may equal the Treasury bond rate or the dividend yield on a stock index. This method allows the value of capital income to deviate from property compensation, assuming imperfect competition and non-constant returns to scale. For a detailed discussion of these two alternative methods and associated sensitivity analysis, see Appendix 2 Sensitivity Analysis of Capital Inputs of the *ABS Experimental Estimates of Industry Multifactor Productivity* (cat. no. 5260.0.55.001).

19.61 The ABS follows the endogenous method in producing its official productivity estimates. For the corporate sector, $i_{it}$, is solved for all assets in each industry by assuming that gross operating surplus, $GOS_{it}$ equals the rental price multiplied by the real productive capital stock in each industry:

$$GOS_{i,t} = \sum_j r_{i,j,t} K_{i,j,t}$$

and substituting for the rental price in equation (19.4) giving:

$$GOS_{i,t} = \sum_j K_{i,j,t}\left(T_{i,j,t}\left(i_{i,t}P_{i,j,t-1} + \delta_j P_{i,j,t} - \pi_{i,j,t}\right) + x_{i,t}P_{i,j,t-1}\right) \qquad (19.5)$$

so

$$i_{i,t} = \frac{GOS_{i,t} - \sum_j K_{i,j,t}\left(T_{i,j,t}\left(\delta_j P_{i,j,t} - \pi_{i,j,t}\right) + x_{i,t}P_{i,j,t-1}\right)}{\sum_j K_{i,j,t}T_{i,j,t}P_{i,j,t}} \qquad (19.6)$$

19.62 To prevent negative rental prices, the ABS imposes a floor limit on the internal rate of return of CPI plus 4%, otherwise the endogenous rate is used.

19.63 The depreciation of a capital asset measures the change in its real economic value during the accounting period. The depreciation rates are derived using asset age-price profiles. The age-price profiles are constructed by using corresponding age-efficiency profiles, multiplied by a suitable discount rate (the ABS chooses a real discount rate at 4 per cent ). See Chapter 14 for the detailed description of age-efficiency and age-price profiles and their roles in constructing various capital components.

19.64 The capital gain or loss due to revaluation can be calculated as an asset-specific deflator or a general deflator. As defined in equation (19.3), the asset-specific capital term is used and calculated as the percentage change in the value of the asset in time *t-1* relative to its value in time *i*. Alternatively, $\pi_t$ can be replaced by a general price deflator such as the consumer price index. The former is preferred because it is able to account for the large changes in relative prices across heterogeneous asset classes and therefore reduces measurement errors. However, the disadvantage of using asset-specific deflators is that it often introduces volatility into the rental price equation.

19.65 The elemental capital inputs are compiled at a detailed level. There are capital input measures for up to 16 asset types for the corporate and unincorporated entities for each of the 16 ANZSIC industry divisions that comprise the market sector. For each capital input there is a volume indicator of the flow of capital services and a rental price that is used to weight the service flow with the service flows of other capital inputs.

### Capital service flows for fixed assets

19.66 The estimates of fixed assets from the PIM that are used to derive MFP are:

- machinery and equipment: computers and computer peripherals; electronic and electrical machinery and communications equipment; industrial machinery and equipment; road vehicles; other transport equipment; and other equipment;
- non-dwelling construction;
- ownership transfer costs of non-dwelling construction;
- intellectual property products: computer software; research and development; mineral and petroleum exploration; and artistic originals (Film and TV; music; and literary);
- orchards, plantations and vineyards; and
- livestock.

19.67 Ownership transfer costs relating to non-dwelling construction are allocated to industry using industry proportions of chain volume non-dwelling construction by industry. This approach assumes that the proportion of ownership transfer costs to non-dwelling construction at a point in time does not vary between industries.

### Inventories

19.68 Volume estimates for the stock of inventory items are obtained for Divisions A to I (see Chapter 10 for more details). They are non-capitalised assets that are used up in the productive process and collected according to three categories:

- inventories of raw materials, including materials and fuels, spare parts designated for use in fixed assets, containers and packaging materials. Inventories of fuels for sale are included in inventories of finished goods;
- Inventories of work-in-progress, including partially processed or fabricated goods which will be further processed prior to sale, and general work-in-progress less payments billed. Prepayments are excluded;
- Inventories of finished goods, including goods manufactured or processed which are ready for sale, goods purchased from other businesses which are ready for resale without further processing, and fuels for sale. Hired goods, inventories of land, and rented or leased buildings are excluded.

### Land

19.69 Land can be further classified as either agricultural (for ANZSIC Division A) or non-agricultural (for the other ANZSIC divisions). Volume estimates of agricultural and non-agricultural land and the corresponding rental prices are constructed separately.

19.70 The volume estimate for agricultural land is derived starting with a nominal estimate obtained from the National Balance Sheet in the ASNA (cat. no. 5204.0). In particular, the value of 'Rural' land in the reference year is used. As there is no suitable price index for agricultural land, its volume is assumed to be constant over time. The estimates of land values are discussed further in the feature article 'Valuing Land and Dwellings Owned by Households' in the ASNA 2005-06.

19.71 Similarly, a volume estimate of non-agricultural land is derived starting with a nominal estimate of the market sector's non-agricultural land in the reference year. A benchmark estimate is obtained from the National Balance Sheet by multiplying total 'Commercial' and 'Other' land by the proportion of the stock of non-dwelling construction in the market sector. This estimate is then split by industry proportionally using the productive capital stock of non-dwelling construction in the reference year. Then for a given industry, the volume estimate is constructed by assuming that its growth rate is half the growth rate of the industry's real productive capital stock of non-dwelling construction.

19.72 To calculate the rental prices for land, proxy price indicators are used as suitable land price indexes are not available. For agricultural land, the total investment deflator for Agriculture, forestry and fishing is used for the years prior to 1995-96, and the all groups CPI is used thereafter. For non-agricultural land, the index is based on the weighted aggregation of commercial and industrial rent indexes for Australia's main capital cities, provided by a private sector contractor.

#### Operating leases and finance leases

19.73 The ABS classifies the use of capital as an intermediate input of the lessee when the capital is rented under an operational lease arrangement from a firm primarily operating in another industry. For example, a construction company may lease a crane from the rental and hiring industry, which is recorded as a service component in the intermediate inputs of the lessee and as capital services held by the lessor. If the proportion of the capital that is leased is changing it can affect value added productivity growth estimates. A reduction in the percentage of capital held within an industry over time, such as when a firm leases rather than purchases capital, would understate growth in the capital service index, which would have the effect of overstating value added MFP growth. For capital held under a long term finance lease, the capital is treated as capital owned by the lessee and included in the productive capital stock estimates of the lessee industry.

### Measurement of labour input

19.74 There are three common methods of measuring labour input:

1. number of employed persons;
2. hours worked; and
3. quality adjusted hours worked.

19.75 Indexes of hours worked are preferred to employment numbers because hours worked captures changes in overtime, standard weekly hours, leave, and part-time work. Quality adjusted hours worked further captures changes in the education and experience of the workforce. The ABS publishes productivity statistics on both an hours worked basis and quality adjusted hours worked basis.

#### Hours worked indexes

19.76 The ABS publishes indexes of hours worked for each ANZSIC06 industry, the market sector, and the whole economy in the ASNA[48]. These indexes capture trends in hours worked and are derived from estimates of hours actually worked obtained from the Labour Force Survey. They measure the hours worked by all workers engaged in the production of goods and services by civilian wage and salary earners, employers, self-employed persons, unpaid family workers, and members of the Australian Defence Force.

19.77 For productivity measurement, the aggregate indexes of hours worked are considered to be of good quality, though they are published as indexes as levels may be subject to reporting bias. That is, there may be a tendency for respondents in the LFS to either overestimate or underestimate their hours worked. Industry levels of hours worked may also be subject to a reporting bias due both to the number of hours reported, as well as self-selecting the industry they work in. [49] Thus, industry based hours worked levels are considered

[48] Hours worked indexes for the market sector and the whole economy are also published in the quarterly national accounts. Experimental Estimates of Industry Multifactor Productivity also contains hours worked for each industry, the market sector and the 12 selected industries.

[49] Caution is recommended making level comparisons, particularly for industries as differences in collection methods between the LFS and variables sourced from other economic collections (using the ABS business register) may distort comparisons.

less reliable than the aggregate levels. However, the indices are expected to be of good quality since it is reasonable to assume that the bias does not change over time and so does not affect the growth rate.

19.78 The ABS surveys hours worked for one week in each month, so hours worked for the unobserved weeks are imputed. Adjustments are made for non-random events such as public and school holidays. The labour force survey collects hours worked by industry for the four mid-quarter weeks, so industry proportions for the representative week are assumed to hold for the quarter. Similarly, the arithmetic average of the four representative weeks of each quarter is used to estimate the annual industry proportions. Both of these methods assume that the effects of holidays and other seasonal factors are constant across all industries.[50] For a more technical description of the estimation method, see *ABS Research Paper: Estimating Average Annual Hours Worked* (cat. no. 1352.0.55.077).

### Quality adjusted hours worked index

19.79 Measuring labour input as hours worked implicitly assumes that the workforce is homogeneous. That is, it does not recognise improvements to human capital due to the varying educational achievements and experience within the workforce. An alternative approach is to use quality adjusted labour inputs (QALI). QALI indexes are published for the market sector and the 12 selected industries in *Experimental Estimates of Industry Multifactor Productivity*. [51]

19.80 The quality changes in labour input are captured through accounting for heterogeneity across different types of workers. The traditional method of measuring labour input is to simply sum hours of all types of worker with identical weights. The modern growth accounting framework measures labour input as weighted aggregates of different types of workers with weights reflecting differences in productive capacity across different types of workers. In this way, increases in labour input can be divided between total hours worked and compositional changes in the labour force. As the workforce evolves with more educated workers replacing less educated workers, this compositional change can directly affects how much output can be produced from a given quantity of hours worked. The labour compositional change combined with labour share has become a standard method for quantifying the contribution of human capital to economic growth within the modern growth accounting framework.[52]

19.81 The underlying conceptual framework for QALI is discussed in more detail in *Research Paper: Quality-adjusted Labour Inputs, Nov 2005* (cat. no. 1351.0.55.010). However, the estimation methods, in particular of wage rates for each type of workers, have changed and are described below.

[50] The hours worked indexes published in the ASNA and in 5260.0.55.003 contain the holiday correction. However this correction has not been applied to the detailed labour force estimates in cat. no. 6291.0.55.003.
[51] The ABS is currently working on constructing QALI indexes for each ANZSIC 2006 industry. For example, Wei and Zhao present some preliminary QALI results for each of the 12 selected industries in *The Industry Sources of Australia's Productivity Slowdown,* paper presented at the Second World KLEMS Conference at Harvard University, 2012.
[52] For example, see Chapter 1 'The Human Capital Century' of Claudia Goldin and Lawrence F. Katz, *The Race between Education and Technology*, Harvard University Press (2008).

19.82 The workforce is cross-classified by sex, education and age groups. The details of this classification are provided in Tables 19.1 and 19.2.

Table 19.1 Classification of workers for each industry

| Characteristic | Categories |
|---|---|
| Sex | Male |
| | Female |
| Education | Unqualified |
| | Skilled labour |
| | Bachelor degree |
| | Higher degree |
| Age | 15 to 24 years |
| | 25 to 34 years |
| | 35 to 44 years |
| | 45 to 54 years |
| | 55 to 64 years |

Table 19.2 Descriptions of education categories

| Education category | Description |
|---|---|
| Unqualified | Workers with at most a high school qualification |
| Skilled labour | Workers with a non-university post-secondary qualification (e.g. a TAFE qualification of an apprenticeship) |
| Bachelor degree | Workers with a university degree other than a Masters or a Doctorate |
| Higher degree | Workers with a Masters or a Doctorate |

19.83 Hours worked indexes for each group are combined as a Törnqvist index using income shares as the weights. So a QALI index measures both changes in hours worked and changes in quality (that is, changes in educational achievement and experience). In the productivity growth accounts, the changes in quality are also referred to as labour composition.

19.84 The aggregate QALI indexes have grown faster than the corresponding unadjusted hours worked indexes, implying that labour quality has been increasing. Assuming that higher wages reflect a higher marginal product of labour, labour quality will increase when the high wage rate groups of workers increase their hours worked faster than the low wage rate groups.

19.85 MFP on an hours worked basis has generally exceeded MFP on a quality adjusted hours worked basis. The difference in the MFP growth rates represents the change in labour composition, which is explicitly identified when the growth accounts are expressed on a quality adjusted hours worked basis.

19.86 Aggregate QALI indexes for the market sector and 12 selected industries are compiled using full Australian Census data. Note that since the census data are used, the inter-census periods are interpolated so care should be taken interpreting year on year changes in labour composition.

## Capital and labour income shares

19.87 The capital and labour income shares, $S_K$ and $S_L$ are derived from the current price factor income accounts. For a given industry or aggregate, total income can be decomposed into:

- gross operating surplus (GOS) of corporations and general government;
- gross mixed income (GMI) of unincorporated firms;
- compensation of employees (COE); and
- taxes less subsidies on production and imports (IBT).

Note that total income includes the GOS of general government but not the GOS of dwellings owned by persons, as ownership of dwellings is excluded from the market sector.

19.88 Both GMI and IBT include capital and labour components. That is, GMI and IBT can be further decomposed into income attributable to labour and capital, as described in the next two sections. So total income can be written as:

$$Total\ Income = GOS + GMI(K) + GMI(L) + COE + IBT(K) + IBT(L)$$

where K and L are income attributable to capital and labour, respectively.

19.89 Thus the income share of capital is

$$S_K = \frac{GOS + GMI(K) + IBT(K)}{Total\ Income}$$

and the income share of labour is

$$S_L = \frac{COE + GMI(L) + IBT(L)}{Total\ Income}$$

## Capital and labour shares of gross mixed income

19.90 The labour and capital shares of income earned by unincorporated enterprises are subsumed into one national accounts aggregate: gross mixed income (GMI). The following procedure is used to impute labour and capital shares of this aggregate for each industry in the market sector.

19.91 An estimate of labour income is imputed by assuming that proprietors and unpaid helpers receive the same average compensation per hour as wage and salary earners. Similarly, an estimate of proprietors' capital income is derived by multiplying the unincorporated productive capital stock of each asset type by the corporate rental prices. These estimates are then scaled so they sum to the observed GMI. The capital and labour shares of GMI are the corresponding scaled estimates.

19.92 That is, the capital share of GMI is

$$s_i \sum_j r_{c,i,j} K_{u,i,j}$$

where $s_i$ is the scaling factor for industry $i$, $r_{c,i,j}$ is the corporate rental price of asset $j$ in industry $i$, and $K_{u,i,j}$ is the productive capital stock of asset $j$ in industry $i$ for unincorporated enterprises.

19.93 The labour share of GMI is

$$s_i w_i H_{u,i}$$

where $s_i$ is (again) the scaling factor for industry $i$, $w_i$ is the average hourly income for wage and salary earners in industry $i$, and $H_{u,i}$ is the hours worked by proprietors and unpaid helpers in industry $i$.

19.94 The scaling factor $s_i$ for industry $i$ is given by

$$s_i = \frac{GMI}{\widehat{GMI}_{u,i}}$$

and $\widehat{GMI}_{u,i}$ for each industry is imputed, based on the labour and capital cost as

$$\widehat{GMI}_{u,i} = w_i H_{u,i} + \sum_j r_{c,i,j} K_{u,i,j}$$

19.95 Some taxes and subsidies on production and imports can be attributed solely to either capital or labour (for example, land tax and payroll tax). However such taxes and subsidies make up only a small proportion of total net taxes. Thus the capital and labour shares of net taxes are allocated proportionally using the other income components attributable to labour and capital.

### Gross output income shares

19.96 The gross output income shares are derived similarly except that intermediate inputs need to be included:

$$Total\ Income = GOS + GMI(K) + GMI(L) + COE + IBT(K) + IBT(L) + Intermediate\ inputs$$

19.97 Thus the income share of capital is

$$Z_K = \frac{GOS + GMI(K) + IBT(K)}{Total\ Income}$$

and the income share of labour is

$$Z_L = \frac{COE + GMI(L) + IBT(L)}{Total\ Income}$$

and the income share of intermediate inputs is

$$Z_M = \frac{Intermediate\ inputs}{Total\ Income}$$

## Estimation formulae

### Capital services index

19.98 Capital services index for each industry is estimated (for both corporate and unincorporated entities) by weighting together the real growth in the productive capital stock of different assets, weighted together using the two-period average value share of each type of capital services. The indexes are compiled in the form of a Törnqvist index (i.e. the weighted geometric mean of the component growth rates). The quantity index of capital services in industry *i* is calculated as:

$$\ln\left(\frac{K_{i,t}}{K_{i,t-1}}\right) = \sum_j s_{K,i,j,t} \ln\left(\frac{K_{i,j,t}}{K_{i,j,t-1}}\right) \qquad (19.7)$$

and the two period average value share of each type of capital services is given by

$$s_{K,ijt} = \frac{\left(\frac{r_{i,j,t}K_{i,j,t}}{\sum_j r_{i,j,t}K_{i,j,t}} + \frac{r_{i,j,t-1}K_{i,j,t-1}}{\sum_j r_{i,j,t-1}K_{i,j,t-1}}\right)}{2}$$

where

$\ln\left(\frac{K_{i,t}}{K_{i,t-2}}\right)$ is the capital input growth rate for industry *i* from period *t-1* to period *t,*

$\ln\left(\frac{K_{i,j,t}}{K_{i,j,t-1}}\right)$ is the productive capital stock growth rate for capital asset *j* in industry *i*, from period *t-1* to period *t.*

19.99 The capital input growth rate for the market sector, $\ln\left(\frac{K_{m,t}}{K_{m,t-1}}\right)$, is given by:

$$\ln\left(\frac{K_{m,t}}{K_{m,t-1}}\right) = \sum_j s_{K,mjt} \ln\left(\frac{K_{m,j,t}}{K_{m,j,t-1}}\right) \qquad (19.8)$$

and the two period average value share of each type of capital services is given by

$$s_{K,mjt} = \frac{\left(\frac{r_{m,j,t}K_{m,j,t}}{\sum_j r_{m,j,t}K_{m,j,t}} + \frac{r_{m,j,t-1}K_{m,j,t-1}}{\sum_j r_{m,j,t-1}K_{m,j,t-1}}\right)}{2}$$

Labour input index

19.100 Labour input index for each industry is calculated as a Törnqvist volume index of hours worked of different types of workers:

$$\ln\left(\frac{L_{i,t}}{L_{i,t-1}}\right) = \sum_j s_{L,ijt} \ln\left(\frac{H_{i,j,t}}{H_{i,j,t-1}}\right) \qquad (19.9)$$

and the two period average value share of each type of workers in the industry labour compensation is given by

$$s_{L,ijt} = \frac{\left(\frac{W_{i,j,t}H_{i,j,t}}{\sum_j W_{i,j,t}H_{i,j,t}} + \frac{W_{i,j,t-1}H_{i,j,t-1}}{\sum_j W_{i,j,t-1}H_{i,j,t-1}}\right)}{2}$$

where

$\ln\left(\frac{L_{i,t}}{L_{i,t-1}}\right)$ is the labour input growth rate for industry *i* from period *t-1* to period *t*

$\ln\left(\frac{H_{i,j,t}}{H_{i,j,t-1}}\right)$ is the growth rate of hours worked for *j* the type of workers in industry *i*, from period *t-1* to period *t*

$W_{i,j,t}$ *is the wage rate for j* the type of workers in industry *I* at time t.

19.101 Labour input index for the market sector is calculated as a Törnqvist volume index of hours worked of different types of workers:

$$\ln\left(\frac{L_{m,t}}{L_{m,t-1}}\right) = \sum_j s_{L,mjt} \ln\left(\frac{H_{m,j,t}}{H_{m,j,t-1}}\right) \qquad (19.10)$$

and the two period average value share of each type of workers in the industry labour compensation is given by

$$s_{L,mjt} = \frac{\left(\frac{W_{m,j,t}H_{m,j,t}}{\sum_j W_{m,j,t}H_{m,j,t}} + \frac{W_{m,j,t-1}H_{m,j,t-1}}{\sum_j W_{m,j,t-1}H_{m,j,t-1}}\right)}{2}$$

where

$\ln\left(\frac{L_{m,t}}{L_{m,t-1}}\right)$ is the labour input growth rate for the market sector from period *t-1* to period *t*

$\ln\left(\frac{H_{m,j,t}}{H_{m,j,t-1}}\right)$ is the growth rate of hours worked for *j* the type of workers in the market sector from period *t-1* to period *t*

$W_{m,j,t}$ *is the wage rate for j* the type of workers in the market sector at time t.

Industry combined primary inputs index

19.102 Industry combined primary inputs index is calculated as a Tornqvist index of primary inputs - capital and labour:

$$\ln\left(\frac{I_{i,t}^{(V)}}{I_{i,t-1}^{(V)}}\right) = \frac{1}{2}\left(v_{K,i,t} + v_{K,i,t-1}\right)\ln\left(\frac{K_{i,t}}{K_{i,t-1}}\right) + \frac{1}{2}\left(v_{L,i,t} + v_{L,i,t-1}\right)\ln\left(\frac{L_{i,t}}{L_{i,t-1}}\right) \qquad (19.11)$$

where

$\ln\left(\frac{I_{i,t}^{(V)}}{I_{i,t-1}^{(V)}}\right)$ is primary input growth rate for industry *i* from period *t-1* to period *t*

$\ln\left(\frac{K_{i,t}}{K_{i,t-1}}\right)$ is the capital input growth rate for industry *i*,

$\ln\left(\frac{L_{i,t}}{L_{i,t-1}}\right)$ is the labour input growth rate for industry *i*,

$v_{K,i}$ is the capital share in value-added based total industry income, and

$v_{L,i}$ is the labour share in value-added based total industry income.

Gross output based combined input index

19.103 The gross output based combined input index is constructed as:

$$\ln\left(\frac{I_{i,t}^{(G)}}{I_{i,t-1}^{(G)}}\right) = \frac{1}{2}\left(z_{K,i,t} + z_{K,i,t-1}\right)\ln\left(\frac{K_{i,t}}{K_{i,t-1}}\right) + \frac{1}{2}\left(z_{L,i,t} + z_{L,i,t-1}\right)\ln\left(\frac{L_{i,t}}{L_{i,t-1}}\right) + \frac{1}{2}\left(z_{X,i,t} + z_{X,i,t-1}\right)\ln\left(\frac{X_{i,t}}{X_{i,t-1}}\right) \qquad (19.12)$$

where

$\ln\left(\frac{I_{i,t}^{(G)}}{I_{i,t-1}^{(G)}}\right)$ is the gross output based input growth rate for industry *i* from period *t-1* to period *t*.

$\ln\left(\frac{X_{i,t}}{X_{i,t-1}}\right)$ is the intermediate input growth rate for industry *i*, and $z_{K,i,t}$, $z_{L,i,t}$ and $z_{X,i,t}$ are the capital, labour and intermediate input share of total industry income respectively.

Market sector primary input index

19.104 The combined primary input index for the market sector is calculated as:

$$\ln\left(\frac{I_{M,t}^{(V)}}{I_{M,t-1}^{(V)}}\right) = \frac{1}{2}\left(v_{K,t} + v_{K,t-1}\right)\ln\left(\frac{K_{M,t}}{K_{M,t-1}}\right) + \frac{1}{2}\left(v_{L,t} + v_{L,t-1}\right)\ln\left(\frac{L_{M,t}}{L_{M,t-1}}\right) \qquad (19.13)$$

where

$\ln\left(\frac{K_{M,t}}{K_{M,t-1}}\right)$ is the capital input growth rate for the market sector,

$\ln\left(\frac{L_{M,t}}{L_{M,t-1}}\right)$ is the labour input growth rate for the market sector, and

$v_{K,t}$ and $v_{L,t}$ is the capital and labour share respectively in total income in the market sector.

19.105 The capital and labour income shares, $v_K$ and $v_L$ respectively, are defined below:

$$v_{K,t} = \frac{\sum_{i \in M}\left(GOS_{i,t} + GMI(K)_{i,t} + IBT(K)_{i,t}\right)}{\sum_{i \in M}\left(COE_{i,t} + GMI(L)_{i,t} + IBT(L)_{i,t}\right) + \sum_{i \in M}\left(GOS_{i,t} + GMI(K)_{i,t} + IBT(L)_{i,t}\right)}$$

$$v_{L,t} = \frac{\sum_{i \in M}\left(COE_{i,t} + GMI(L)_{i,t} + IBT(L)_{i,t}\right)}{\sum_{i \in M}\left(COE_{i,t} + GMI(L)_{i,t} + IBT(L)_{i,t}\right) + \sum_{i \in M}\left(GOS_{i,t} + GMI(K)_{i,t} + IBT(L)_{i,t}\right)}$$

Industry value added based MFP calculations

19.106 The industry value-added based MFP growth is calculated as the industry value added growth rate minus the industry combined primary input growth rate:

$$\ln\left(\frac{A_{i,t}^{(V)}}{A_{i,t-1}^{(V)}}\right) = \ln\left(\frac{V_{i,t}}{V_{i,t-1}}\right) - \ln\left(\frac{I_{i,t}^{(V)}}{I_{i,t-1}^{(V)}}\right) \qquad (19.14)$$

where

$\ln\left(\frac{A_{i,t}^{(V)}}{A_{i,t-1}^{(V)}}\right)$ is the industry value added MFP growth rate and

$\ln\left(\frac{V_{i,t}}{V_{i,t-1}}\right)$ is the industry value-added growth rate.

Industry gross output based MFP calculations

19.107 Gross output based MFP index is calculated as the industry gross output growth rate minus the industry gross output based combined input growth rate:

$$\ln\left(\frac{A_{i,t}^{(G)}}{A_{i,t-1}^{(G)}}\right) = \ln\left(\frac{G_{i,t}}{G_{i,t-1}}\right) - \ln\left(\frac{I_{i,t}^{(G)}}{I_{i,t-1}^{(G)}}\right) \qquad (19.15)$$

where

$\ln\left(\frac{A_{i,t}^{(G)}}{A_{i,t-1}^{(G)}}\right)$ is the industry gross output based MFP growth rate and

$\ln\left(\frac{G}{G_{i,t-1}}\right)$ is the industry gross output growth rate.

Multifactor productivity for the market sector

19.108 The market sector MFP is calculated as the market sector output growth rate minus the market sector combined input growth rate:

$$\ln\left(\frac{A_{M,t}^{(V)}}{A_{M,t-1}^{(V)}}\right) = \ln\left(\frac{V_{M,t}}{V_{M,t-1}}\right) - \ln\left(\frac{I_{M,t}^{(V)}}{I_{M,t-1}^{(V)}}\right) \qquad (19.16)$$

where

$\ln\left(\frac{A_{M,t}^{(V)}}{A_{M,t-1}^{(V)}}\right)$ is the market sector MFP growth rate and

$\ln\left(\frac{V_{M,t}}{V_{M,t-1}}\right)$ is the market sector output growth rate.

## Links between industry level and the market sector productivity measures

19.109 Aggregate productivity measures, such as the market sector labour productivity and MFP statistics, represent the average set of efficiencies and productivity levels across the individual industries making up the market sector. The aggregate productivity can improve because some industries further raise their productivity and because more productive industries increase their relative shares in the market sector. In the context, aggregate productivity measures are inherently linked to industry productivity measures.

19.110 The links between the ABS aggregate productivity measures and the industry productivity are implicit. In compiling market sector productivity measures, an aggregate production function approach is applied whereby aggregate outputs, aggregate labour input, aggregate capital and aggregate productivity, are separately defined and measured. This approach treats the market sector as a single big 'industry'. In this case, the ABS aggregate productivity statistics are independently of corresponding industry productivity measures. In order to quantify the industry contributions to the market sector productivity performance, some standard methods have been developed to conduct this analysis.

### Decomposition of aggregate labour productivity

19.111 Stiroh[53] developed a decomposition framework to identify the industry sources of aggregate labour productivity growth, which becomes a standard method for analysing industry contributions to aggregate labour productivity growth (Bosworth and Triplett[54], Timmer et al.[55]). An ABS productivity research paper (see Wei and Zhao[56]) has applied this method to link the market sector labour productivity growth to the industry sources. The decomposition formula is given as:

$$\ln\left(\frac{ALP_t}{ALP_{t-1}}\right) = \sum_i w_i \ln\left(\frac{LP^y_{i,t}}{LP^y_{i,t-1}}\right) + \left[\sum_i w_i \ln\left(\frac{H_{i,t}}{H_{i,t-1}}\right) - \sum_i h_i \ln\left(\frac{H_{i,t}}{H_{i,t-1}}\right)\right] - \left[\sum_i m_i \left(\ln\left(\frac{X_{i,t}}{X_{i,t-1}}\right) - \ln\left(\frac{Y_{i,t}}{Y_{i,t-1}}\right)\right)\right] \qquad (19.17)$$

19.112 Using the value added concept of labour productivity, equation (19.7) can be simplified to

$$\ln\left(\frac{ALP_t}{ALP_{t-1}}\right) = \sum_i w_i \ln\left(\frac{LP^V_{i,t}}{LP^V_{i,t-1}}\right) + \left[\sum_i w_i \ln\left(\frac{H_{i,t}}{H_{i,t-1}}\right) - \sum_i h_i \ln\left(\frac{H_{i,t}}{H_{i,t-1}}\right)\right] \qquad (19.17a)$$

where

$ALP$ is the aggregate labour productivity (aggregate value added per hour),

$LP_i^y$ is the gross output labour productivity for industry $i$,

$LP_i^v$ is the value added labour productivity for industry $i$,

$w_i$ is the two period average of industry $i$'s share in aggregate value added,

$h_i$ is the industry $i$'s share in aggregate hours in period $t$-$1$,

$m_i$ is the two period average of the ratio of industry $i$'s intermediate input in aggregate value added, and

M, Y and H stand for intermediate input, gross output and hours worked respectively.

19.113 The first term in equation 19.7 is a 'direct productivity effect', with is equal to the weighted sum of industry gross output productivity growth rates, with the industry shares in total value added as weights. This term

[53] Stiroh, Kevin J., "Information Technology and the US Productivity Revival: What Do the Industry Data Say?" *American Economic Review*, 92(5), 2002, pp. 1559-76

[54] Bosworth, Barry P. and Jack E. Triplett, *Services Productivity in the United States: Griliches' Services Volume Revisited,* Washington, DC, Brookings Institute, 2003

[55] Timmer, Marcel P., Robert Inklaar, Mary O'Mahony, and Bart van Ark, *Economic Growth in Europe: A Comparative Industry Perspective*. Cambridge University Press, 2010

[56] Wei, Hui and Pengfei Zhao, Industry Sources of Australia's Productivity Slowdown, paper presented at the Second World KLEMS Conference at Harvard University, 2012

captures the impact of productivity growth in each industry. As industry labour productivity rises, the aggregate labour productivity also improves in proportion to industries' shares in aggregate output.

19.114 The second term in equation 19.7 is a 'labour reallocation effect' that captures the impact on aggregate output of the shift of labour between low-productivity-level industries and high-productivity-level industries. Aggregate productivity growth depends not only on the rates of productivity within industries but also on changes in the composition of industries. Faster employment growth in high-productivity-level industries contributes to improvements in the aggregate labour productivity growth by increasing the size of aggregate output given the same quantity of hours worked.

19.115 The third term in equation 19.7 is the intermediate input intensity factor. As value added is defined as gross output minus intermediate input, the relative growth of intermediate inputs over gross output must be accounted for in aggregating industry gross output to reach aggregate output, which is a value added concept. For example, if growth of intermediate input usage is faster than that of gross output, the growth of value added is reduced and hence the growth rate of aggregate labour productivity declines. If less intermediate inputs are used for a given level of gross output, then more value added is created and hence aggregate labour productivity improves.

### Decomposition of market sector MFP measures

19.116 The market sector MFP measures are compiled basically by the aggregate production function approach. The aggregate production function approach assumes that output and input factors receive the same prices across all industries, which implies that output and input shifts between industries leave aggregate output and inputs unchanged. Under this scenario, aggregator output and inputs are simply the sums (unweighted) of industry outputs and inputs. Therefore, the impact on the aggregate productivity performance of output and input reallocations between industries are missing in the market sector MFP measures.

19.117 The market sector MFP measures can be also compiled by using the Domar weighting scheme, as demonstrated by Zheng[57] and Wei and Zhao (2012). The Domar aggregation method derives the market sector MFP measures as the weighted sums of industry MFP growth rates, with weights equal to the shares of industry gross output to the market sector value added.

19.118 The market sector MFP measure, $MFP^A$, compiled by the aggregate production function approach, is related to the Domar measure ($MFP^D$) in the following formula:

$$MFP^A = MFP^D + \left[\ln\left(\frac{\sum_i V_{i,t}}{\sum_i V_{i,t-1}}\right) - \sum_i w_i \ln\left(\frac{V_{i,t}}{V_{i,t-1}}\right)\right] + \left[\sum_i w_i \ln\left(\frac{K_{i,t}}{K_{i,t-1}}\right) - \ln\left(\frac{K_{M,t}}{K_{M,t-1}}\right)\right] + \left[\sum_i w_i \ln\left(\frac{L_{i,t}}{L_{i,t-1}}\right) - \ln\left(\frac{L_{M,t}}{L_{M,t-1}}\right)\right]$$

$$MFP^A = MFP^D + REALL_V + REALL_K + REALL_L \qquad (19.18)$$

where

$MFP^A = \ln\left(\frac{A^{(V)}_{M,t}}{A^{(V)}_{M,t-1}}\right)$, which is defined by equation (19.16),

$MFP^D = \sum_i w_i \ln\left(\frac{A^{(V)}_{i,t}}{A^{(V)}_{i,t-1}}\right)$,

$w_i$ is industry value added share in the market sector,

$\ln\left(\frac{A^{(V)}_{i,t}}{A^{(V)}_{i,t-1}}\right)$ is defined by equation (19.14),

$V_i$ is value added for industry *i*,

$\ln\left(\frac{K_{i,t}}{K_{i,t-1}}\right)$ is defined by equation (19.7),

$\ln\left(\frac{K_{M,t}}{K_{M,t-1}}\right)$ is defined by equation (19.8),

[57] Zheng, Simon, "*Estimating Industry Level Multifactor Productivity: Methods and Experimental Results.*" Australian Bureau of Statistics Research paper (ABS cat. no 1351.055.004), 2005

$\ln\left(\frac{L_{I,t}}{L_{I,t-1}}\right)$ is defined by equation (19.9), and

$\ln\left(\frac{L_{M,t}}{L_{M,t-1}}\right)$ is defined by equation (19.10).

19.119 Equation (19.9) decomposes the aggregate MFP growth, measured by the aggregate production function approach, to the industry sources of MFP growth. The first source of aggregate MFP growth is the weighted sum of industry MFP growth rates. The other terms capture reallocation effects of output, capital and labour across industries. This framework allows us, in the context of ABS MFP statistics, to connect the aggregate market sector MFP statistics, which are broadly compiled using aggregate production function approach, to the industry level MFP statistics.

## ACCURACY, QUALITY AND RELIABILITY OF PRODUCTIVITY MEASURES

19.120 Economic statistics may be fit for one purpose but may not be fit for others. MFP measures are developed for conducting analysis of long term productivity growth. It is not ideal for users to employ them for assessing short term productivity fluctuations. Caution needs to be exercised in interpreting productivity measures, which are derived as a 'residual' and are therefore subject to any errors in the output and input measures. Such errors carry a relatively greater importance with respect to productivity estimates, which are calculated as a ratio of outputs to inputs. In the short to medium term, MFP estimates are subject to variations in capacity utilisation or other factors such as the weather. Taking into account these factors, MFP estimates are probably most useful when viewed as average growth rates between growth-cycle peaks, which tends to also remove much of the random error.

19.121 The approach taken for estimating MFP is based on neoclassical economic theory using a translog production function in conjunction with two assumptions: constant returns to scale; and that the marginal products of capital and labour are equal to their respective real market prices. This forms the basis of the growth accounting approach to estimating MFP.

19.122 However, these assumptions are unlikely to hold in practice. If there are scale efficiencies then this will also be captured as an increase in MFP. This possibility is likely as there would be many firms operating in an environment of increasing returns to scale, especially over short periods. The assumption that the marginal products of capital and labour are equal to their market price is based on perfect competition existing in factor markets.

19.123 In practice, growth in MFP may contain the impact of many phenomena in addition to disembodied technological change, such as:

- economies of scale and scope;
- reallocation effects of capital and labour;
- changes in the work force and management practices;
- climate and water availability;
- variations in capacity utilisation; and
- measurement error.

19.124 Also, MFP estimates are subject to the vagaries of the growth in the business cycle (as capacity utilisation varies so does MFP growth). Taking into account all of these factors, MFP estimates are probably most useful when computed as average growth rates between growth-cycle peaks, which are determined as peak deviations of the market sector MFP index from its long-term trend. In this way, most of the effects of variations in capacity utilisation and much of the random error are removed. However, average growth rates still reflect any systematic bias resulting from the methodology and data used.

ANNEX A GROWTH ACCOUNTING FRAMEWORK

19A.1 The growth accounting framework is derived from a model based on a production function. A production function gives the maximum obtainable output for given inputs at a specific point in time.

## Value added production function

19A.2 When output is measured as value added and the inputs considered are labour and capital, output is modelled

$$V_t = A_t F(K_t, L_t) \qquad (19A.1)$$

where

$V_t$ is real value added at time $t$,

$A_t$ is multifactor productivity at time $t$,

$F$ is the production function at time 0,

$K_t$ is the real capital input at time $t$,

$L_t$ is the real labour input at time $t$, and

$t$ is a continuous measure of time.

19A.3 Note that the production function $F$ s not observable for the actual economy. Thus to measure productivity an expression for $A_t$ not involving $F$ must be derived. To do so, two assumptions are made about the production function $F$. First, that it exhibits constant returns to scale. That is, for any positive $\lambda\partial$ the production function satisfies

$$F(\lambda K, \lambda L) = \lambda F(K, L)$$

19A.4 In words, this means that (say) doubling both inputs will double the output. Second, we assume that the marginal returns to capital and labour equal their respective real market prices. That is, we assume that

$$\frac{\partial F}{\partial K}(K_t, L_t) = r_t$$

and

$$\frac{\partial F}{\partial L}(K_t, L_t) = w_t$$

where $r_t$ is the real rental price of a unit of capital (at time $t$) and $w_t$ is the real wage rate for a unit of labour (at time $t$).

19A.5 Now, differentiating $F$ with respect to time gives

$$\dot{V}_t = \dot{A}_t F(K_t, L_t) + A_t\left(\frac{\partial F}{\partial K}\dot{K}_t + \frac{\partial F}{\partial L}\dot{L}_t\right)$$

$$= \dot{A}_t F(K_t, L_t) + \frac{\partial V_t}{\partial K}\dot{K}_t + \frac{\partial V_t}{\partial L}\dot{L}_t \qquad (19A.2)$$

Where for any variable X, $\dot{X}$ denotes the derivative of a function $X$ with respect to time.

19A.6 Now dividing equation (19A.2) by $V_t$ gives

$$\frac{\dot{V}_t}{V_t} = \frac{\dot{A}_t}{A_t} + \frac{\partial V_t}{\partial K}\frac{\dot{K}_t}{V_t} + \frac{\partial V_t}{\partial L}\frac{\dot{L}_t}{V_t}$$

$$= \frac{\dot{A}_t}{A_t} + \frac{\partial V_t}{\partial K}\frac{K_t}{V_t}\frac{\dot{K}_t}{K_t} + \frac{\partial V_t}{\partial L}\frac{L_t}{V_t}\frac{\dot{L}_t}{L_t} \qquad (19A.3)$$

19A.7 Since we have assumed that the marginal products of capital and labour are equal to their respective real market prices, equation (19A.3) becomes

$$\frac{\dot{V}_t}{V_t} = \frac{\dot{A}_t}{A_t} + S_{K,t}\frac{\dot{K}_t}{K_t} + S_{L,t}\frac{\dot{L}_t}{L_t} \qquad (19A.4)$$

where

$$S_{K,t} = r_t\frac{K_t}{V_t}$$

$$S_{L,t} = w_t\frac{L_t}{V_t}$$

19A.8 Note that $S_{K,t}$ and $S_{L,t}$ are the (value added) income shares of capital and labour, respectively. Now as the production function exhibits constant returns to scale, income can be attributed to either capital or labour; that is, we have

$$S_{K,t} + S_{L,t} = 1$$

19A.9 To translate equation (19.4) into a discrete time equivalent, a Tornqvist index formula is chosen. Using a Tornqvist index follows international best practice. It is preferred to other index formulas due having desirable properties (from a microeconomic perspective) as shown by Diewert.[58] In particular, an index of multifactor productivity is calculated using the equation:

$$\ln\left(\frac{A_t}{A_{t-1}}\right) = \ln\left(\frac{V_t}{V_{t-1}}\right) - \bar{S}_{K,t}\ln\left(\frac{K_t}{K_{t-1}}\right) - \bar{S}_{L,t}\ln\left(\frac{L_t}{L_{t-1}}\right) \qquad (19A.5)$$

where

$$\bar{S}_{K,t} = \frac{1}{2}\left(S_{K,t} + S_{K,t-1}\right)$$

and

$$\bar{S}_{L,t} = \frac{1}{2}\left(S_{L,t} + S_{L,t-1}\right)$$

19A.10 Note that $\ln\left(\frac{X_t}{X_{t-1}}\right)$ is an approximation to the growth of $X_t$ when this growth is small. That is

$$\ln\left(\frac{X_t}{X_{t-1}}\right) \approx \frac{X_t - X_{t-1}}{X_{t-1}}$$

[58] Diewert, Erwin, "Exact and Superlative Index Numbers" Journal of Econometrics, No. 2(May), 1976, 115-45

19A.11 Equation (19A.5) provides the standard growth accounting framework for growth in real value added. From this equation the contributions of MFP, capital, and labour to growth in value added are quantified:

- the contribution of capital is defined to be the growth rate of capital input times the capital share of value added $\bar{S}_{K,t}\Delta \ln K_t$;
- the contribution of labour is defined to be the growth rate of labour input times the labour share of the value added $\bar{S}_{L,t}\Delta \ln L_t$; and
- the contribution of multifactor productivity is defined as the residual

$$\ln\left(\frac{V_t}{V_{t-1}}\right) - \bar{S}_{K,t}\ln\left(\frac{K_t}{K_{t-1}}\right) - \bar{S}_{L,t}\ln\left(\frac{L_t}{L_{t-1}}\right)$$

that is, as the growth of value added not attributed to capital or labour.

19A.12 Note that when labour is measured as quality adjusted hours worked the contribution of labour can be further decomposed into the contributions of labour quality and hours worked.

## Gross Output Production Function

19A.13 The gross output based measure of MFP is an approach that includes the use of intermediate inputs as a source of output growth. For each industry, a production function postulated is as follows:

$$G_t = A^G H(K_t L_t X_t) \qquad (19A.6)$$

where

$G_t$ = real output,

$K_t$ = real capital input,

$L_t$ = real labour input,

$X_t$ = real intermediate input,

$A_t^G$ = the gross output index of MFP, reflecting technological change, etc.

$H(K_t L_t X_t)$ = a function of factor inputs $K_t$, $L_t$ and $X_t$ that defines the expected level of output at time $t$, given the conditions of technology in the base period

$t$ = a continuous measure of time.

19A.14 For equation (19A.6), we make the assumptions of constant returns to scale and competitive equilibrium. Then differentiating with respect to time and dividing both sides by $G_t$, it can be shown that

$$\frac{\dot{G}_t}{G_t} = \frac{\dot{A}^G}{A^G} + S_K\frac{\dot{K}_t}{K_t} + S_L\frac{\dot{L}_t}{L_t} + S_X\frac{\dot{X}_t}{X_t} \qquad (19A.7)$$

where $\dot{G}$, $\dot{K}$, $\dot{L}$ and $\dot{X}$ are derivatives with respect to time:

$$\dot{G} = \frac{\partial G}{\partial t}, etc.$$

the weights $S_K$, $S_L$ and $S_X$ are the output elasticities of the three inputs:

$$Z_K = \frac{\partial G}{\partial K}\frac{K}{G},$$

$$Z_L = \frac{\partial G}{\partial L}\frac{L}{G}, and$$

$$Z_X = \frac{\partial G}{\partial X}\frac{X}{G}$$

and weights $Z_K$, $Z_L$ and $Z_X$ are the relative cost shares of capital, labour and intermediate inputs in the total cost:

$$Z_k = \frac{Kr_K}{Gp_G},$$

$$Z_L = \frac{Lw_L}{Gp_G}, and$$

$$Z_X = \frac{Xp_X}{Gp_G}$$

where

$r_K$ = the rental price of capital services;

$w_L$ = the price of labour;

$p_X$ = the price of intermediate inputs; and

$p_G$ the price of gross output

19A.15 Equation (19A.7) can be rearranged to show that the growth rate of multifactor productivity is equal to the growth rate of the ratio of output to inputs as follows:

$$\frac{\dot{A}^G}{A^G} = \frac{\left(\frac{\dot{G}}{I}\right)}{\frac{G}{I}}$$

where

$$\frac{\dot{I}}{I} = Z_K\frac{\dot{K}}{K} + Z_L\frac{\dot{L}}{L} + Z_X\frac{\dot{X}}{X}$$

19A.16 This implies that productivity can be expressed as the ratio of output to a composite index of inputs:

$$A_t^G = \frac{G_t}{I_t} \qquad (19A.8)$$

where the index $I_t$, is computed as a Törnqvist index as follows:

$$\frac{I_t}{I_{t-1}} = \left(\frac{K_t}{K_{t-1}}\right)^{(Z_{Kt}+Z_{K(t-1)})/2}\left(\frac{L_t}{L_{t-1}}\right)^{(Z_{Lt}+Z_{L(t-1)})/2}\left(\frac{X_t}{X_{t-1}}\right)^{(Z_{Xt}+Z_{X(t-1)})/2}$$

and $Z_{Kt}$, $Z_{Lt}$ and $Z_{Xt}$ are the respective relative cost shares of capital, labour and intermediate inputs respectively.

ANNEX B COMPILING QUALITY-ADJUSTED LABOUR INPUT INDEXES

19B.1 This annex provides a detailed description of how quality adjusted labour inputs (QALI) indexes are compiled for the market sector and the 12 selected industries. Recall that QALI indexes can be written as a combination of labour composition and unadjusted hours worked. Census data are used to estimate labour composition for the whole economy. Then these estimates are combined with hours worked data for the market sector and 12 selected industries to obtain the corresponding QALI indexes. So we assume that changes in labour composition of the whole economy, the market sector, and the 12 selected industries are the same.

19B.2 The general formula for calculating QALI indices is as follows. The workforce is partitioned into groups $g_1, \ldots, g_K$ for each year $t$. This assumes that for each group $g$ we have an hours worked index $H_{g,t}$. Note that the sum of hours worked over each group

$$H_t = \sum_{j=1}^{K} H_{g_j,t}$$

is the unadjusted hours worked index. It is further assumed that for each group $g$ we have the average hourly income $w_{g,t}$. Then the QALI index $\frac{L_t}{L_{t-1}}$ is given by

$$\frac{L_t}{L_{t-1}} = \prod_{j=1}^{K} \left( \frac{H_{g_j,t}}{H_{g_j,t-1}} \right)^{\left(s_{g_j,t} + s_{g_j,t-1}\right)/2} \qquad (19B.1)$$

where

$$s_{g_j,t} = \frac{w_{g_j,t} H_{g_j,t}}{\sum_{j-1}^{K} w_{g_j,t} H_{g_j,t}}$$

is income share of group $g_j$ in year $t$.

19B.3 Now labour composition is defined to be the ratio $\frac{L_t}{H_t}$. For the equation above, we see that an index for labour composition is given by

$$Q_t = \frac{L_t/H_t}{L_{t-1}/H_{t-1}} = \frac{L_t/L_{t-1}}{H_t/H_{t-1}} \qquad (19B.2)$$

The term $Q_t$ is the compositional change (in year t).

19B.4 Let $p_{g,t} = \frac{H_{g,t}}{H_t}$ be the proportion of hours worked by group $g$ in year $t$. Then we can write $Q_t$ as

$$Q_t = \prod_{j=1}^{K} \left( \frac{p_{g_j,t}}{p_{g_j,t-1}} \right)^{\left(\hat{s}_{g_j,t} + \hat{s}_{g_j,t-1}\right)/2} \qquad (19B.3)$$

where

$$\hat{s}_{g_j,t} = \frac{w_{g_j,t} p_{g_j,t}}{\sum_{j-1}^{K} w_{g_j,t} p_{g_j,t}}$$

19B.5 To calculate the compositional changes from the census data the workforce is grouped by education, age, and sex (see Table 19.1). For education there are four categories: Unqualified, Skilled Labour, Bachelor Degree, and Higher Degree; for age there are five categories: 15 to 24 years, 25 to 34 years, 35 to 44 years, 45 to 54 years, and 55 to 64 years; for sex there are two categories: Male and Female. Definitions of the education categories are given in Table 19.2. From the census data, we derive the proportion of hours worked and average hourly wage of workers with a given education level, age group, and sex (for all choices of education level, age group, and sex). Note that to take into account time spent in education, we restrict the age range of workers considered depending on the education category (see Table 19.2).

Table 19B.1 Age range of workers considered by education category

| Education category | Age range of workers |
|---|---|
| Unqualified | 15 to 64 |
| Skilled labour | 20 to 64 |
| Bachelor degree | 21 to 64 |
| Higher degree | 23 to 64 |

19B.6 Compositional changes for the whole economy are calculated from 1981 until the current year using census data. Census data are only available every five years (in 1981, 1986, etc), so much data has to be interpolated. The years falling between census years are linearly interpolated for both $p_{g,t}$ and $w_{g,t}$. For example, the years 1982 to 1985 are defined as

$$p_{g,1981+t} = p_{g,1981} + \frac{t}{5}\left(p_{g,1986} - p_{g,1981}\right)$$

and

$$w_{g,1981+t} = w_{g,1981} + \frac{t}{5}\left(w_{g,1986} - w_{g,1981}\right)$$

For $t = 1,2,3,4, \ldots.$, $Q_t$ is then calculated or years 1981 to the latest census year for which data is available. Finally the compositional changes for years past the last census year are extrapolated using the following formula:

$$Q_{2006+t} = Q_{2006}\left(\frac{Q_{2006}}{Q_{2001}}\right)^{1/5}$$

19B.7 The extrapolation assumes that the yearly changes in compositional change past the last census year are equal to the (average) yearly change during the latest inter-census period.

ANNEX C MEASUREMENT OF THE INCOME TAX PARAMETER

19C.1 The income tax parameter, $T_{ijt}$, allows for the variation of income tax allowances according to different industries, asset types, and variations in allowances over time. Changes in corporate profit taxes over time are also allowed for. Corporate taxes aside, these provisions increase the after-tax returns on investment and lower the rental price of capital. For each industry $i$, and asset type $j$, $T_{ijt}$ is expressed as:

$$T_{ijt} = \frac{1 - u_t z_{ijt} - u_t a_{ijt}}{1 - u_t}$$

where

$u_t$ = the corporate profit tax rate,

$z_{ijt}$ = the present discounted value of one dollar of depreciation allowances, and

$a_{ijt}$ = the additional allowance rate

19C.2 The tax parameter reflects the differing tax circumstances that owners of capital face. The method adopted by ABS follows Jorgenson (1963) and Hall and Jorgenson (1967, 1971) and reflects changes to:

- tax concessions
- write off periods i.e., tax lives
- deductions allowable
- allowable capital expenditure
- special allowances; and
- amortisation of capital

19C.3 For example, allowance is made for the differing depreciation and additional allowances available to specific industries and asset types over time. These allowances tended to be more generous in the Agriculture, forestry and fishing, Mining, and Manufacturing industries, especially for certain types of equipment. In addition, the Australian Taxation Office allowed for faster depreciation rates over time through shorter effective tax lives. Since 1985, various research and development (R&D) tax concessions have been introduced to encourage increased investment in R&D by Australian companies. These concessions have had the effect of reducing rental prices on R&D considerably.

19C.4 The Corporate Profit Tax Rates ($u$) are obtained from the Australian Tax Office (ATO) website.

## Depreciation allowances

19C.5 The depreciation allowance ($z$) is the present discounted value (PDV) of the stream of deductions multiplied by the marginal tax rate applicable in that year. Asset lives and a *nominal* discount rate are used to determine the present discounted value of depreciation allowances. Prior to 1980, the average asset lives used to calculate capital stock for each asset type are used. After 1980, the asset life consistent with the shortest life within broad asset life bands specified by the ATO is used. Broad banding reduces the effective life of the asset. The nominal discount rate is based on the business overdraft rate published in the *Reserve Bank Bulletin*. It assumes that the business overdraft rate applies to all borrowers for investment in equipment or structures and contains a risk premium (over and above government bonds).

19C.6 Specific rulings on eligible depreciation allowances are obtained from the MTG. Of the two depreciation schedules permitted, the *diminishing value* method has been chosen. Prior to 10 May 2006, it allowed software and machinery and equipment assets to be geometrically depreciated at 150 per cent of the straight-line rate (the other schedule permitted). From 10 May 2006, the government introduced a 200 per cent diminishing balance rate for eligible new plant and equipment assets.

19C.7 From 1980, broad banded depreciation rates were introduced, allowing assets with effective lives over a particular band of years to depreciate at a certain rate. For example, in 1996, assets with a life of 0-3 years could be depreciated immediately and assets with a life of 3 to 5 years could be depreciated at a prime cost rate of 40 per cent of its purchase price.

19C.8 In addition to broad banding, from 1990 the Commonwealth Government allowed a loading factor of between 18 per cent and 20 per cent, depreciating some assets more quickly. Most equipment except motor vehicles were permitted to use loading factors.

19C.9 Double depreciation allowances were permitted for most assets for the period in 1974-76. Between 1 July 1974 and 30 June 1976, companies were allowed to depreciate new investment excluding motor vehicles at twice the stated rates. Once purchased, the asset continued to be depreciated at these accelerated rates until completely depreciated. We treat this by doubling the loading factor which has the effect of doubling the depreciation rate.

19C.10 In 1980 the Commonwealth Government permitted a separate allowance for buildings. Depending on the year, a straight-line allowance of 2.5 per cent or 4 per cent was permitted. This allowance is treated in the same way as depreciation allowance in the tax parameter.

19C.11 On 1 July 2001, the government introduced the "uniform capital allowances regime". This regime replaced the special capital allowance provisions for the Mining industry. The regime applied to all depreciable assets except where specific provisions apply to R&D activities, investments in Australian films, or cars.

19C.12 In 2002, statutory effective life caps were introduced, allowing an accelerated depreciation for certain types of equipment. Specifically, statutory life caps halved the effective tax lives of aircraft (to 10 years) and buses and trucks (larger than 3.5 tonnes) to 7.5 years.

### Computer software

19C.13 Depreciation rates are applied to purchased (packaged) software, customised, and in-house software combined. MTG defines in-house software as: "In-house software is computer software, or a right to use such software, that is acquired, developed or commissioned, and that is mainly for the taxpayer to use in performing the functions for which the software was developed, i.e. not for resale. From May 1998, acquiring, developing or commissioning software is depreciable at 40% per annum, so the asset life is 2.5 years.

### Non dwelling construction (NDC)

19C.14 The effective lives of 'industrial' buildings and 'non-industrial' buildings are 25 years and 40 years respectively.

### Film tax concessions

19C.15 According to the MTG 2011, three types of film concession were available in 2010-11. Since a film's eligibility for tax concessions is limited to one of the concession types, the 'additional allowance rate' for film has been set at 15%, which is the lowest available concession rate.

### Non depreciable assets

19C.16 For land and inventories, the effective life does not apply to these capital assets as they are not subjected to depreciation resulting from production.

### Additional allowance rate

19C.17 The additional allowance rate (a) is an immediate write-off which results in tax savings (i.e. discounting is not required). The value of an allowance is the tax savings which is the product of the tax rate and the rate of the allowance. For example, if the allowance rate is 50% and the profit tax rate is 30%, then the company effectively saves 15% of the purchase price of the asset in tax savings ($30\% \times 50\% = u \times a$). Most equipment types have attracted an allowance of some kind.

19C.18 There are general allowances across all industries and special allowances. Special allowances vary widely according to asset type and time period. For example, in 1996 purchasers of machinery and equipment (other than motor vehicles) were permitted to deduct an additional 10 per cent in the purchase year.

19C.19 Pro-rata adjustments are made to align the dates of the tax law with the financial year, assuming that investment occurred evenly over the tax year. This leads to determining pro-rata depreciation rates based on the portion of the year covered.

19C.20 Some allowances may have not been taken into consideration because of the assets eligible may be at a finer detail than assets classes to which tax parameters can be assigned (i.e. the asset classification in the perpetual inventory model), or because further research was needed. The ABS welcomes comments which may assist in improving the accuracy and fitness-for-purpose of tax parameters.

### Research and development

19C.21 Since 1985, tax incentives have been available to encourage increased investment in research and development (R&D) by Australian companies. Up until 2010-11, the 'R&D Tax Concession' program was in place. The most recent elements of the R&D Tax Concession included:

a. An enhanced rate of tax deduction at 125% of eligible expenditure incurred on Australian R&D activities of at least $20,000. Eligible R&D expenditures included salaries and wages to company employees associated with the R&D activities, along with expenditure on materials used and an allowance for the decline in value of capital equipment used in R&D.

b. A premium 175% rate of tax deduction applied to the amount of R&D expenditure that exceeds a given company's average expenditure over the previous 3 years.

19C.22 This tax concession scheme had been treated as a general allowance for all industries. Between 1985 and 2011, the allowance in (a) ranged from 125% to 150%.

19C.23 From July 1, 2011, the 'R&D Tax Concession' was replaced by the 'R&D Tax Incentive'. The R&D Tax Incentive aims to encourage companies to engage in R&D activities where the knowledge gained is likely to benefit the wider Australian economy. The two key components of the R&D tax incentive are:

c. A 45% refundable tax offset (equivalent to a 150% deduction at a 30% company income tax rate) on Australian R&D activities of at least $20,000 for companies with an aggregated turnover of less than $20 million per annum. Companies can receive a cash refund for income years where a tax loss is recorded.

d. A non-refundable 40% tax offset (equivalent to a 133% deduction at a 30% company income tax rate) to all other companies, allowing for unused offset amounts to be carried forward for use in future income years.

19C.24 Effectively, the treatment of the tax parameter is the same for both schemes. The ABS estimates that most R&D spending will fall into (d), attracting the 40% tax offset.

# CHAPTER 20 ANALYTICAL MEASURES

## INTRODUCTION

20.1 This chapter outlines some of the analytical measures of interest derived from national accounting aggregates.

20.2 These measures include:

- real income measures;
- real unit labour costs;
- national income, consumption, saving and wealth (annually only);
- farm and non-farm GDP;
- income related measures;
- gross entrepreneurial income (annually only);
- new private business investment (quarterly only); and
- inventories and sales (quarterly only).

## REAL INCOME MEASURES

20.3 Many flows in the SNA, such as cash transfers, do not have price and quantity dimensions of their own and cannot therefore be decomposed in the same way as flows related to goods and services. While such flows cannot be measured in volume terms they can nevertheless be measured "in real terms" by deflating their values with price indices in order to measure their real purchasing power over some selected basket of goods and services that serves as the numeraire.

20.4 It is possible by use of a numeraire to deflate any income flow in the accounts, and even a balancing item such as saving may be deflated by a price index in order to measure the purchasing power of the item in question over a designated numeraire set of goods and services. By comparing the deflated value of the income with the actual dollar value of the income in the same year, it is possible to determine by how much the purchasing power of the income has increased or decreased. Income deflated in this way is generally described as "real income".

20.5 "Real" incomes are dependent on two points of reference:

1. real incomes are measured with reference to the price level in some selected reference year; and
2. real incomes measure changes in purchasing power over some selected numeraire.

20.6 In a closed economy without exports or imports, GDP is equal to the sum of final consumption plus capital formation. This sum is described as domestic final demand. GDP is also a measure of the income generated in the economy by production. Although income cannot be expressed as the product of prices and volumes, if GDP can be deflated, then in effect this must also be a measure of income in real terms. However, with the inclusion of imports and exports, GDP is no longer identical to domestic final expenditure and deflation of GDP must allow for the deflation of imports and exports as well as of domestic final expenditures. Even if imports and exports are equal in current values, they usually have different prices so there is an impact on real income measures from import and export prices. This is generally done by considering the terms of trade and calculating what is known as the trading gains and losses from changes in the terms of trade.

20.7 Further, the total real income that residents derive from domestic production depends also on the rate at which exports may be traded against imports from the rest of the world.

20.8 The terms of trade are defined as the ratio of the price of exports to the price of imports. If the prices of a country's exports rise faster (or fall more slowly) than the prices of its imports (that is, if its terms of trade improve) fewer exports are needed to pay for a given volume of imports so that at a given level of domestic production, goods and services can be reallocated from exports to consumption or capital formation. Thus,

an improvement in the terms of trade makes it possible for an increased volume of goods and services to be purchased by residents out of the incomes generated by a given level of domestic production.

20.9 All the aggregates referred to above are calculated in current values. The influence of changes in prices may also be eliminated. Domestic product is calculated in volume terms in order to measure the real change that occurs from one period to another. This is possible because output, intermediate consumption, taxes on products and subsidies on products can all be calculated in volume terms. On the other hand, aggregates of income may not be expressed in volume terms because income flows cannot, strictly speaking, be broken down into a quantity and a price component. They may, however, be calculated at constant purchasing power, which is described as being in real terms. When moving from domestic product in volume terms to national income in real terms, the effect of changes in the terms of trade between the total economy and the rest of the world must be taken into account.

20.10 The usual way to calculate real income figures is to start from real GDI and then follow the normal sequence of income aggregates, but with every intervening adjustment deflated to real terms. The various measures calculated include:

- real gross domestic income;
- real gross national income;
- real net national disposable income; and
- real net national disposable income per capita.

## Real gross domestic income

20.11 Real gross domestic income (real GDI) measures the purchasing power of the total incomes generated by domestic production. It is a concept that exists in real terms only. When the terms of trade change there may be a significant divergence between the movements of GDP in volume terms and real GDI. The difference between the change in GDP in volume terms and real GDI is generally described as the "trading gain" (or loss); alternatively, the trading gain or loss from changes in the terms of trade is the difference between real GDI and GDP in volume terms. If imports and exports are large relative to GDP and if the commodity composition of the goods and services that make up imports and exports is very different, the scope for potential trading gains and losses may be large. This may happen, for example, when the exports of a country consist mainly of a small number of primary products, such as cocoa, sugar or oil, while its imports consist mainly of manufactured products. Trading gains or losses, T, are usually measured by the following expression:

$$T = \frac{X - M}{P} - \left\{\frac{X}{P_x} - \frac{M}{P_m}\right\}$$

where

$X$ = exports at current values

$M$ = imports at current values

$P_x$ = the price index for exports

$P_m$ = the price index for imports

$P$ = a price index based on some selected numeraire.

20.12 $P_x$, $P_m$ and $P$ all equal 1 in the base year. The term in brackets measures the trade balance calculated at the export and import prices of the reference year whereas the first term measures the actual current trade balance deflated by the numeraire price index. It is perfectly possible for one to have a different sign from the other.

20.13 In measurement of trading gains or losses, the 2008 SNA leaves the choice of the price index with which to deflate the current trade balance to the statistical agency in each country to decide according to their own national circumstances. In Australia, the price index P reflects import prices. The reason is that trade permits consumption of a different mix of products than are produced domestically. Because exports generate income which in turn finances the acquisition of imports, it is considered appropriate to deflate the trade balance by the price of imports.

20.14 RGDI is calculated by summing gross national expenditure (GNE), the statistical discrepancy and exports and subtracting imports. Exports are first deflated by the imports deflator to take into account the change in the terms of trade. That is:

$$Real\ gross\ domestic\ income = GNE + SD + deflated\ X - M$$

20.15 The chain volume measure is then benchmarked to the annualised RGDI index.

### Real gross national income

20.16 Primary incomes generated in the production activity of resident producer units are distributed mostly to other resident institutional units; however, part of them may go to non-resident units. Symmetrically, some primary incomes generated in the rest of the world may come from resident units. This leads to the definition and measurement of real gross national income (GNI). Real GNI is equal to GDP in volume terms less deflated primary incomes payable to non-resident units plus deflated primary incomes receivable from non-resident units, where deflation is via the implicit price deflator for gross national expenditure (GNE). In contrast to volume GDP, real GNI is not a concept of value added, but a concept of income.

20.17 By removing the volume measure of consumption of fixed capital from real GNI, real net national income (NNI) is obtained.

### Real net national disposable income

20.18 Primary incomes receivable by resident institutional units may be used in part to make transfers to non-resident units and resident units may receive transfers originating out of primary incomes in the rest of the world. Real gross national disposable income is equal to real GNI less deflated current transfers (other than taxes, less subsidies, on production and imports) payable to non-resident units, plus the corresponding deflated transfers receivable by resident units from the rest of the world. Again, the implicit price deflator for gross national expenditure (GNE) is used. Real gross national disposable income measures the real income available to the total economy for final consumption and gross saving.

20.19 By removing the volume measure of consumption of fixed capital from real gross national disposable income, real net national disposable income (NNDI) is obtained. National disposable income is the sum of disposable income of all resident institutional units or sectors.

### Real net national disposable income per capita

20.20 Real net national disposable income per capita is calculated by dividing real NNDI by the estimated population as published in the *Australian Demographic Statistics* (cat. no. 3101.0), and ABS projections.

## UNIT LABOUR COSTS

### Introduction

20.21 The ABS produces a range of statistics relating to employee remuneration and the price of labour. These statistics have been developed to meet the needs of users for information on the returns to labour from economic production, the level of employee earnings, and labour costs and prices. Relevant series include the compensation of employees from the Australian System of National Accounts (ASNA), average weekly earnings and the wage price index.

20.22 Another labour cost measure which takes into account labour productivity is called a unit labour cost (ULC) measure. A ULC represents a link between productivity and the cost of labour in producing output.

20.23 ULC are an indicator of the average cost of labour per unit of output produced in the economy. This implies that unit labour costs are costs associated with the employment of labour adjusted for labour productivity. As a result, if there is an increase in average labour costs and there is a commensurate increase in labour productivity there will be no change in the unit labour cost. In contrast to the ULC, the increase in labour

costs associated with increased productivity would be reflected in an increase in the LPI, average COE and AWE.

20.24 Broadly, unit labour costs are defined as:

$$ULC = \frac{Average\ labour\ costs\ (ALC)}{Average\ labour\ productivity\ (ALP)} \qquad (1)$$

20.25 Average labour costs (ALC) are generally calculated as compensation of employees plus payroll tax minus employment subsidies divided by total hours worked by employees. Training and recruitment costs are excluded due to measurement difficulties.

20.26 Average labour productivity (ALP) is commonly defined as real gross value added (the volume of output minus the volume of intermediate consumption) divided by the number of total hours worked. Total hours worked here includes not only hours worked by employees, but also by employers and the self-employed. This is because it is not possible to decompose real gross value added into an 'employee only' component. As labour productivity includes employees, employers and the self-employed, changes in it can come from both the incorporated and the unincorporated sectors. Effectively, average labour productivity is the average productivity change in both these sectors.

20.27 Labour productivity growth reflects growth in two areas. The first is from an increasing capital-labour ratio (capital deepening). That is, more capital per unit of labour input. The second is from increasing multifactor productivity. For example, the introduction of new disembodied technologies, organisational improvements, economies of scale, and the implementation of research and development. Unit labour costs will decrease as capital deepening and multifactor productivity increase.

20.28 More specifically, the ALC and the ALP expressions are:

$$ALC = \frac{Labour\ costs\ (LC)}{Hours\ worked\ by\ employees} \qquad (2)$$

$$ALP = \frac{(Gross\ value\ added\ (GVA)/GDP\ deflator)}{Total\ hours\ worked\ by\ employees\ and\ self\ employed\ (THW)} \qquad (3)$$

$$= \frac{Volume\ GVA}{THW} \qquad (4)$$

20.29 An apparent issue in the ULC formula is that the scope of the denominator, which includes the self-employed, is broader than the scope of the numerator. Equation 5 provides an alternative formulation to show that average labour costs are implicitly assumed to be the same for the self-employed as those for employees. Equation 2 shows ALC is measured for employees only. Using equations 1 and 3, total hours worked by employees and the self-employed can be shifted to the numerator in the ULC equation. The numerator in equation 5 then shows employee labour costs (LC) multiplied by the ratio of total hours worked to employee hours worked. Equation 5 shows the denominator remaining referenced to the whole economy and the numerator also has the same scope by factoring up the known labour costs for employees by the ratio of total hours worked to hours worked by employees. The implicit assumption in both equation 5 and equation 1 above is that the average hourly labour costs of the self-employed are the same as employees.

$$ULC = \frac{Labour\ costs(LC) \times \left(\frac{Total\ hours\ worked}{Hours\ worked\ by\ employees}\right)}{Volume\ GDP} \qquad (5)$$

20.30 It is important to recognise that ULC as formulated here covers more than just the costs of employing employees. Nonetheless, since the costs applied to the self-employed are assumed to be the same as for employees the ULC derived is likely to be applicable to the case of employees only.

20.31 The LPI, AWE and average COE are different representations of average labour costs, with differing purposes. However, none take into account completely the effect that productivity has on reducing labour costs in terms of the cost per unit of output. The ULC adjusts ALC for the effects of productivity.

20.32 The ASNA publishes the following:

- real unit labour costs; and
- real unit labour costs – non-farm.

### Real unit labour costs

20.33 Nominal unit labour costs are subject to general increases in prices across the economy due to the numerator reflecting nominal labour costs. Real unit labour costs (RULC) are often used to eliminate this issue by deflating ALC with the GDP deflator. This provides an indicator that focuses more specifically on the direct labour cost pressures associated with the employment of labour, which excludes general price impacts. Below is a decomposition of real unit labour costs.

$$RULC = \frac{(ALC/GDP\ deflator)}{ALP} \qquad (6)$$

20.34 Substituting equation 3 into 6, the GDP deflator cancels out and this reduces the expression to:

$$RULC = \frac{LC \times \left(\frac{Total\ hours\ worked}{Hours\ worked\ by\ employees}\right)}{GVA} \qquad (7)$$

20.35 The labour income share (LIS) is defined as labour income (COE) divided by total factor income. The above formula shows that the RULC is similar in representation, but not identical to the labour income share. This is because the denominator for RULC, GVA, is slightly larger than the denominator for LIS, total factor income. If RULC is equated to the LIS, then equation 4 shows that the RULC can be placed within a broader theoretical framework defining the link between wages and productivity.

20.36 The quarterly calculations for Real Unit Labour Cost (ULC) are as follows:

Step 1. Derive hours worked by employees

$$Hours\ worked\ by\ employees = Total\ hours\ worked \times \left(\frac{Employees}{Total\ employed}\right)$$

where the employees/total employed ratio is calculated using quarterly hours worked series for employees and total employed which are derived by averaging monthly levels of hours worked. For more information on calculations of hours worked, see paragraph 19.76.

Step 2. Calculate Nominal GDP per hour

$$Nominal\ GDP\ per\ hour = \frac{GDP}{Total\ hours\ worked}$$

Step 3. Calculate labour cost per hour

$$Labour\ cost\ per\ hour = \frac{Labour\ costs}{Hours\ worked\ by\ employees}$$

Step 4. Calculate nominal ULC

$$Nominal\ unit\ labour\ cost = \frac{Labour\ costs\ per\ hour}{GDP\ per\ hour}$$

Step 5. Calculate real ULC by deflating nominal ULC via the GDP deflator.

Step 6. Index the real ULC series to the reference year.

Step 7. Derive annual Real ULC as a transformation of the quarterly series by averaging the level over the four quarters in each year.

### Real unit labour costs – non-farm

20.37 Due to the highly seasonal and variable nature of the agricultural industry, it can be useful to remove the farm economy from the real unit labour costs measure, and analyse movements in real unit labour costs for the non-farm economy. The quarterly calculations for Real Unit Labour Cost non-farm are as follows:

Step 1. Derive hours worked by non-farm employees

$$Hours\ worked\ by\ non\ farm\ employees = Total\ non\ farm\ hours\ worked \times \left(\frac{Employees - farm\ employees}{Total\ employed - farm\ employed}\right)$$

Step 2. Calculate Nominal non-farm GDP per hour

$$Nominal\ non\ farm\ GDP\ per\ hour = \frac{Non\ farm\ GDP}{Total\ non\ farm\ hours\ worked}$$

Step 3. Calculate non-farm labour cost per hour

$$Non\ farm\ labour\ cost\ per\ hour = \frac{Non\ farm\ labour\ costs}{Hours\ worked\ by\ non\ farm\ employees}$$

Step 4. Calculate nominal ULC non-farm

$$Nominal\ non\ farm\ unit\ labour\ cost = \frac{Non\ farm\ labour\ cost\ per\ hour}{Non\ farm\ GDP\ per\ hour}$$

Step 5. Calculate real ULC non-farm by deflating nominal ULC via the non-farm GDP deflator.

Step 6. Index the real ULC non-farm series to the reference year.

Step 7. Derive annual Real ULC non-farm as a transformation of the quarterly series by averaging the level over the four quarters in each year.

### ULC measurement issues

#### Price deflator

20.38 In calculating RULC measures the question arises as to the most appropriate deflator to use when calculating real labour costs. The issue does not exist when considering nominal ULC as labour costs are not deflated and volume GVA must be calculated by using the GDP deflator (see step 5 in paragraph 20.40). Possible deflators to consider for real labour costs are the GDP deflator, GDP chain price index, domestic final demand (DFD) and household final consumption expenditure (HFCE).

20.39 The GDP deflator is preferred because its scope directly relates to the production of goods and services in the domestic economy. Alternative measures such as the domestic final demand (DFD) deflator and the household final consumption expenditure (HFCE) deflator provide a demand side view of price change, which is less relevant in this situation.

#### Terms of trade effect

20.40 Australia's terms of trade (the ratio of export to import prices) has been increasing over recent years. As the terms of trade increases, the GDP deflator will also rise. Therefore there generally is an argument that by using a GDP deflator in the derivation of RULC, growth in RULC may be masked to the extent that the GDP deflator overstates the growth in prices faced by domestic producers.

20.41 In the short run, the important cost factor in determining employers' abilities to meet their wage bill is the actual domestic value of production rather than their purchasing power equivalent. For this reason, it may be the case that the DFD price deflator may be favourable in the unit labour cost equation, as this relates to domestic demand. This does not mean that a judgement as to the capacity of the economy to pay higher wages should not recognise the consequences of a sustained shift in the terms of trade. However, if the interest is in the influence of labour costs on business decisions, then including the terms of trade effects can be inappropriate.

20.42 While it is true that for some producers who compete against relatively cheaper imports the GDP deflator may not be ideal, it is also the case that for exporting producers they do see a relative increase in prices for their outputs. Overall, the GDP deflator continues to be the most appropriate broad measure of price change as it affects domestic producers and hence, even in times when the terms of trade are changing rapidly, the RULC is still compiled using the GDP deflator.

### Treatment of self-employed

20.43 The estimate of ULC includes an estimate for the cost of self-employed labour by assuming that the self-employed earn, on average, the same amount per hour as employees. It would be preferable to determine an appropriate return to labour from within an overall measure of gross mixed income (GMI), which is the national accounts aggregate that measures returns to unincorporated businesses including the self-employed. However, such a calculation requires too many assumptions for ULC compilation purposes.

20.44 More critically, if the purpose of the ULC is to examine the costs of employees, that is, an employers' willingness to employ, then the returns to the self-employed should be excluded. However, in order to implement this in the overall ULC formula it is necessary to remove the self-employed component from both the numerator and the denominator in equation 5. While this is trivial for the numerator, it is not possible to define volume GVA excluding the self-employed.

## NATIONAL INCOME, CONSUMPTION, SAVING AND WEALTH

20.45 Saving, investment, borrowing and lending, change in net worth and net worth for the nation as a whole and for each institutional sector are all linked by a series of accounting identities in the system of national accounts. The analytical measures of income, saving and wealth, estimated real holding gains and losses and the addition of these and other changes in wealth to traditional measures of income and saving. The ASNA presents these estimates in such a way as to highlight the links between the traditional income flows and the change in net worth as reflected in the balance sheet. The calculation and presentation of these estimates provide additional insights into changes in income, saving and wealth in Australia.

20.46 The concept of disposable income used in the ASNA is directly linked to the measure of production. Disposable income can be generated either directly by participating in the process of production or indirectly through the redistributive process (taxation, transfers such as social assistance benefits, income flows with the rest of the world). Holding gains and losses are excluded from the national accounts income measure as they result from price change, not from production. For some purposes it may be preferable to use a broader definition of income. The broader definition of income which has gained importance in economics is that of J. R. Hicks. The concept is expressed in 2008 SNA: 'income is often defined as the maximum amount that a household, or other unit, can consume without reducing its real net worth.' (2008 SNA, paragraph 8.25).

20.47 This wider definition brings the balance sheet into the measurement of income and saving in order to take account of certain changes in the volume and value of capital during the accounting period. This includes the depletion and discoveries of natural resources, unforeseen losses due to natural disasters, and asset revaluations due to price changes.

20.48 However, there is an important debate in the international national accounts community over the validity of treating real holding gains in the same manner as gross disposable income. The impact of real holding gains on economic activity may not be equivalent to income received in cash or in kind. Arguably, if a real holding gain accrues due to an increase in the price of a particular asset, then if many agents wish to realise this gain and attempt to 'cash out' at the same time, the price may fall and the size of the realised gain may be smaller than the imputed real holding gain. In addition, the realisation of a holding gain may lead to the payment of tax, which would reduce the amount of funds available to the asset holder. Thus the measures introduced here should not be seen as replacing or correcting the traditional income and saving measures in the national accounts. Rather they are provided to give users an alternative view of the available information.

## Key aggregates

20.49 The following analytical measures for income, saving and wealth are presented at a national and household sector level in the ASNA:

### Gross disposable income (GDI) plus other changes in real net wealth

20.50 This item is compiled using data from the income, capital, financial, other changes in assets and revaluation accounts.

$$\begin{aligned} &GDI\ plus\ changes\ in\ real\ net\ wealth \\ &\quad = Gross\ disposable\ income \\ &\quad + Real\ holding\ gains\ and\ losses \\ &\quad + Net\ capital\ transfers \\ &\quad + Other\ changes\ in\ volume \end{aligned}$$

where

$$\begin{aligned} &Real\ holding\ gains\ and\ losses \\ &\quad = Real\ holding\ gains\ and\ losses\ on\ non\ financial\ produced\ assets \\ &\quad + Real\ holding\ gains\ and\ losses\ on\ non\ financial\ non\ produced\ assets\ (land) \\ &\quad + Real\ holding\ gains\ and\ losses\ on\ non\ financial\ non\ produced\ assets\ (other) \\ &\quad + Real\ holding\ gains\ and\ losses\ on\ financial\ assets \\ &\quad - Real\ holding\ gains\ and\ losses\ on\ liabilities \end{aligned}$$

### Net saving plus other changes in real net wealth

20.51 This item can be derived using flow data as follows:

$$\begin{aligned} &Net\ saving\ plus\ changes\ in\ real\ net\ wealth \\ &\quad = GDI\ plus\ changes\ in\ real\ net\ wealth \\ &\quad - Final\ consumption\ expenditure \\ &\quad - Consumption\ of\ fixed\ capital \end{aligned}$$

20.52 This item can be equivalently derived from a balance sheet perspective as follows:

$$\begin{aligned} &Net\ saving\ plus\ changes\ in\ real\ net\ wealth \\ &\quad = Closing\ net\ worth \\ &\quad - Opening\ net\ worth \\ &\quad - Neutral\ holding\ gains \\ &\quad - Net\ errors\ and\ omissions \\ &\quad + Statistical\ discrepancy \\ &\quad - Other\ differences \end{aligned}$$

20.53 Other differences arise due to a different treatment of stock and flow concepts between the balance sheet and capital account estimates. Net capital formation in the balance sheet includes additional components of cultivated biological resources (all animals and not just sheep and cattle as shown in the capital stock tables), livestock and plantation standing timber inventories. These are included in the change in net worth in the balance sheet and excluded from the capital account.

Alternate measure of household final consumption expenditure

20.54 The household sector analytical measures table contains memorandum items for final consumption expenditure on consumer durables and the value of the services provided by the current stock of durables. Unlike other final goods and services which are used up in the same accounting period in which they are purchased, consumer durables (such as cars, refrigerators and computers) provide a flow of services to their owners over several accounting periods. For some purposes, it may be useful to consider the flow of services provided by consumer durables during the accounting period as final consumption expenditure, rather than purchases of consumer durables.

20.55 For more information on the treatment of consumer durables and the services that flow from them, refer to chapter 17.

## FARM AND NON-FARM GDP

20.56 The farm economy has historically been one of the more volatile components of the Australian economy. One of the key reasons is that the farm economy is more exposed to fluctuations in weather conditions compared with other industries. Derivation of non-farm GDP measures allow the removal of farm-related volatility from output growth.

20.57 The farm economy is defined in the ASNA as ANZSIC sub-division 01, Agriculture. It follows that non-farm production arises from all other industries.

20.58 Measures calculated include:

- farm and non-farm GDP – chain volume;
- farm and non-farm GDP – current prices; and
- farm and non-farm GDP – implicit price deflator.

### Farm and non-farm GDP – current prices

20.59 Farm GDP in current prices is defined as:

$$\begin{aligned} Farm\ GDP = {} & gross\ value\ of\ farm\ output \\ & - intermediate\ input\ costs \\ & + taxes\ on\ products\ allocated\ to\ farm \\ & - subsidies\ on\ products\ allocated\ to\ farm \end{aligned}$$

20.60 For details on the calculation of gross value of farm output and intermediate input costs in current prices, see table 9.1.

20.61 When deriving GDP from the value added approach, taxes and subsidies on products cannot be allocated to industry. Accordingly, it is not generally possible to calculate GDP for an industry. An exception is made in this case in order to derive farm GDP. An allocation of taxes less subsidies on products for the farm economy is made by assuming all products primary to the Agriculture industry that attract taxes and subsidies on products are allocated to the farm economy.

20.62 Both the annual and quarterly non-farm GDP are calculated by subtracting farm GDP in current prices from total GDP in current prices.

### Farm and non-farm GDP – chain volume

20.63 Farm GDP in chain volume terms is calculated by deflating and chaining current price farm GDP.

20.64 Non-farm GDP in chain volume terms is calculated by re-expressing the difference between total GDP and farm GDP in chain volume terms.

20.65 It is important to recognise that the derivation of farm GDP (and hence also non-farm GDP) hinges on an allocation of net taxes on products to industry which is not conceptually valid according to 2008 SNA. Users should be aware of this when using these aggregates for analytical purposes.

### Farm and non-farm GDP – implicit price deflator

20.66 Both annual and quarterly IPDs for non-farm GDP are calculated by dividing the current price estimates for non-farm GDP by the chain volume measure for non-farm GDP.

## INCOME RELATED MEASURES

20.67 The various measures calculated include:

- wages share of total factor income;
- profits share of total factor income;
- average compensation per employee;
- non-farm compensation of employees; and
- average non-farm compensation per employee.

### Wages share of total factor income

20.68 Total factor income (TFI) is the sum of the compensation of employees, gross operating surplus and gross mixed income. Wages share of total factor income is the proportion of total factor income that is made up by compensation of employees.

20.69 Wages share of total factor income is calculated as:

$$Wages\ share\ of\ total\ factor\ income = \frac{COE}{TFI} \times 100$$

### Profits share of total factor income

20.70 Profits share of total factor income (TFI) is the percentage of total factor income that is made up by gross operating surplus of financial and non-financial corporations.

20.71 Profits share of total factor income is calculated as:

$$Profits\ share\ of\ total\ factor\ income = \frac{GOS}{TFI} \times 100$$

### Average compensation per employee

20.72 Average COE is an alternate income measure. It is a key analytical aggregate, along with employment, of COE and the labour market as a whole. It is calculated as:

$$Average\ COE = \frac{Total\ COE}{Total\ employees}$$

20.73 For national accounting purposes, COE excludes unpaid work and self-employed workers. Therefore, national accounts employment measure also differs from other published employment figures as it excludes self-employed, volunteer and family workers and is the average of three months' employee estimates.

20.74 While in practice it might be difficult to identify between those who are self-employed and those who are employees, generally an employee is defined as someone who works for cash or payment in kind and has a formal agreement with their employer.

20.75 Total employees include:

- Civilian – sourced from the *Labour Force, Australia* (cat. no. 6291.0) and is an average of three months employee estimates;
- Defence – sourced from the Department of Defence and the data received is permanent forces split by Navy, Air Force and Army; and
- Farm – sourced from the *Labour Force Survey* (cat. no. 6291.0) and the data used is employee estimates from ANZSIC06 division A, subdivision 01.

### Non-farm compensation of employees

20.76 Due to the highly seasonal and variable nature of the agricultural industry, it can be useful to remove farm COE from total COE to allow analysis of movements in non-farm COE. Non-farm COE is calculated as:

$$Non\ farm\ COE = total\ COE - farm\ COE$$

where farm COE is equal to the COE for ANZSIC subdivision 01 and is sourced from the production account.

### Average non-farm compensation per employee

20.77 Average non-farm COE is calculated as:

$$Average\ non\ farm\ COE = \frac{Non\ farm\ COE}{Non\ farm\ employees}$$

where non-farm employees equals Civilian employees plus Defence employees.

## GROSS ENTREPRENEURIAL INCOME

20.78 Entrepreneurial income for a corporation, quasi-corporation, or an institutional unit owning an unincorporated enterprise engaged in market production, is defined as its gross operating surplus (or gross mixed income), plus property income receivable on the assets owned by the enterprise, less interest payable on the liabilities of the enterprise and rent payable on land or other tangible non-produced assets rented by the enterprise.

20.79 Gross entrepreneurial income (GEI) for non-financial corporations is calculated by summing gross operating surplus and total property income receivable, then subtracting interest payable and rent on natural assets payable.

20.80 GEI for financial corporations is calculated by summing gross operating surplus and total property income receivable, then subtracting interest payable, rent on natural assets payable, and property income attributable to insurance policyholders.

20.81 GEI for households is derived by summing gross operating surplus, gross mixed income and total property income receivable, then subtracting interest payable and rent on natural assets payable.

## NEW PRIVATE BUSINESS INVESTMENT

20.82 New private business investment is the sum of new non-dwelling construction, new machinery and equipment, cultivated biological resources and intellectual property products. It also includes second-hand asset sales by the public sector to private corporations (only). The second-hand assets included are non-dwelling construction and machinery and equipment.

20.83 New private business investment is published quarterly in *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0).

INVENTORIES AND SALES

### Private non-farm inventory levels

20.84 Two series are compiled. One is the level of private non-farm inventories closing book values expressed in chain volume measures. It includes mining, manufacturing, wholesale, retail, and other non-farm and non-public sector inventories.

20.85 The other is the level of closing book values expressed in current prices. The scope is the same as for chain volume measures. It is compiled as the cumulative sum of the change in book values captured by the Quarterly Business Indicators Survey, augmented by some modelled estimates to cover industries out of scope of QBIS. The closing book value inventory levels produced by QBIS are further adjusted to remain consistent with benchmarks produced by supply-use balancing.

20.86 These series are published on a quarterly basis only.

### Sales

20.87 Total sales is household final consumption expenditure on goods combined with both public and private gross fixed capital formation and the exports of goods.

20.88 Domestic sales excludes the exports of goods from total sales.

20.89 Domestic sales is derived by summing private final expenditure:

$$\begin{aligned} Domestic\ sales = {} & household\ final\ consumption\ expenditure\ (HFCE) \\ & + total\ gross\ fixed\ capital\ formation\ (GFCE) \\ & - public\ corporations\ GFCE \\ & - general\ government\ GFCE \end{aligned}$$

20.90 Total sales is calculated by adding total exported goods (Total non-rural, Total rural, and gold) to domestic sales:

$$\begin{aligned} Total\ sales = {} & domestic\ sales \\ & + total\ exported\ goods \end{aligned}$$

20.91 These series are compiled on a quarterly basis only.

### Private non-farm inventories to total sales

20.92 Private non-farm inventories to sales is a simple ratio between private non-farm inventory closing book values and total sales. It is compiled on a quarterly basis only, and is calculated as:

$$Private\ non\ farm\ inventories\ to\ total\ sales = \frac{Private\ non\ farm\ inventories}{Total\ sales}$$

### Imports to domestic sales

20.93 Imports to domestic sales is a simple ratio between imports of merchandise goods and domestic sales. It is compiled on a quarterly basis only, and is calculated as:

$$Imports\ to\ domestic\ sales = \frac{Imports\ of\ merchandise\ goods}{Domestic\ sales}$$

where goods credits for general merchandise equals rural goods plus non-rural goods and goods debits for general merchandise equals consumption goods plus capital goods plus intermediate and other merchandise goods.

# CHAPTER 21 STATE ACCOUNTS

## INTRODUCTION

21.1 The State accounts are a geographic disaggregation into states and territories of the national accounts data presented in the ABS publications *Australian System of National Accounts* (cat. no. 5204.0), and *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0). Experimental state accounts[59] were published in 1984, followed by the first official estimates in 1987[60]. They are now published annually in *Australian National Accounts: State Accounts* (cat. no. 5220.0).

21.2 The state accounts provide a picture of state and territory economies which is comparable to concepts of GDP (all measures) and other key national accounts concepts such as household income and household consumption.

21.3 The key output of the state accounts is annual Gross State Product (GSP) which is directly comparable in concept to the national measure of Gross Domestic Product (GDP). The ABS does not produce quarterly GSP, but quarterly state final demand (SFD) is calculated. SFD is directly comparable to domestic final demand at the national level. SFD is a partial measure of GSP measured by the expenditure approach, in that it excludes both international and interstate trade as well as changes in inventories. As such the two measures should not be directly compared.

21.4 Throughout this chapter the term 'state' refers to all states and territories of Australia.

## HISTORY AND PURPOSE OF GROSS STATE PRODUCT

### Introduction

21.5 Gross state or regional product (as it is more commonly known internationally) is the equivalent of gross domestic product for a region of a national economy. This can be produced for a region of any size whether it be a state, territory or district. In the Australian context this is compiled for the six states and two territories and is termed Gross State Product (GSP).

21.6 The history of state or regional product is much shorter than that for the National Accounts: sub-national estimates have only been in existence for approximately 20 years.

21.7 Currently no country compiles a complete set of SNA accounts for regions of a national economy, with most countries focusing on allocating productive activities to regions. This is largely due to conceptual difficulties in allocation of economic activity of multi-region institutional units.

21.8 Some productive activities which operate across regions, such as finance, transport and communications, can be problematic to allocate to state. Work on improving the scope, quality and relevance of the state/regional accounts is continuing internationally and Australian efforts are described throughout this chapter.

21.9 State Accounts are primarily used for purposes of policy formulation and planning by governments. The main use is to assist in formation of policies for industrial development and infrastructure provision as well as planning public finances. GSP is also used to explain GDP results in a regional context as well as comparing growth across regions.

[59] Burrell S. , Daniel J. , Johnson A. and Walters R. , *State Accounts, Australia: Issues and Experimental Estimates,* ABS, Canberra, 1984.
[60] Australian Bureau of Statistics, *Australian National Accounts: State Accounts, 1985-86,* ABS, Canberra, 1987.

### History in Australia

21.10 The ABS first published experimental state estimates in the ABS publication *Australian National Accounts: State Accounts* (cat. no. 5220.0) in 1987. Since this time there has been ongoing work to improve the estimates of GSP and to expand the amount of information contained within the State Accounts. Key milestones and main areas of improvement include:

| | |
|---|---|
| 1984 | Publication of discussion paper *State Accounts Australia: Issues and Experimental Estimates* |
| 1987 | First release of annual *Australian National Accounts: State Accounts, 1985-86* (cat. no. 5220.0) |
| 1993 | First release of quarterly *Australian National Accounts: State Accounts, December quarter 1992* (cat. no. 5242.0 – publication discontinued) |
| 1993-94 | Constant price estimates introduced using average 1989-90 prices for publications 5220.0 and 5242.0 |
| 1997-98 | Implementation of 1993 SNA and introduction of chain volume estimates (change from constant price) |
| 2006-07 | Introduction of GSP(P) estimates and estimates are no longer treated as experimental |
| 2008-09 | Implementation of ANZSIC 2006 and the 2008 SNA. |

## OVERVIEW OF THE STATE ACCOUNTS METHODOLOGY

21.11 The State Accounts are a geographic disaggregation into states and territories of national accounts data. State estimates are compiled by allocating the national economic flows and other transactions to the state in which they occur. These are then aggregated to produce the state accounts. Given the national accounts are compiled according to the 2008 SNA it follows that the state accounts are also consistent with the 2008 SNA. It is worth noting that currently there are no international standards regarding the compilation of regional accounts.

21.12 The state accounts are compiled for the production accounts, as well as the household income account.

### Top down approach – indicator allocation to states

21.13 The state accounts generally uses a top down approach. A top down approach allocates national estimates to the state level using state indicators. This ensures the state estimates are consistent and additive to national aggregates. The method is represented as:

$$State\ estimate = \frac{State\ indicator}{Australian\ indicator} \times Australian\ benchmark$$

21.14 State indicators are derived from a range of ABS and other data sources. State indicators are designed to allocate economic activity in line with the predominant economic interest of the institutional units involved. For productive activity. state allocation is matched to the state location of the factors of production (i.e. labour and capital). Transactions involving the household sector, such as household consumption and income flows, are allocated based upon state of residence of household units involved.

21.15 Some indicators match exactly or closely to national benchmarks for which they are used to allocate to states. This occurs for a small number of data sources such as Government Finance Statistics (GFS), which are built up from state components.

21.16 There are some cases where a national total is disaggregated into two variables of interest, such as state and industry. In such cases, the national total and the state disaggregation are fixed, but an independent derivation of industry split using the top down approach may yield a different set of state totals. In such cases, a residual allocation algorithm is applied to ensure the industry disaggregation (and therefore also the

state by industry disaggregation) is consistent with the state dissection and the national total for that aggregate.

21.17 By contrast, the bottom up approach is used where national estimates in the national accounts are created as the sum of states or more detailed location information. In these cases, state allocation is built into national estimates, which eliminates the need for indicator allocation of national estimates. Ideally, all state-based estimates in both the national and state accounts would be produced using the bottom up approach, however difficulties around allocating productive activity and institutions limit the bottom up approach to a small number of cases.

## OVERVIEW OF GROSS STATE PRODUCT (GSP)

### Introduction

21.18 Gross state product (GSP) is the aggregate which details the total economic production of a state economy and is the state equivalent to GDP. In the ASNA, GSP for the eight state and territories add to GDP in current prices in line with the top down approach.

21.19 As with GDP, there are three approaches to measuring GSP. The major difference between compilation of GDP and GSP is that, for GSP, the income and expenditure measures are combined to overcome measurement issues:

- income (GSP(I));
- expenditure (GSP(E));
- combined income/expenditure measure (GSP(I/E)); and
- production (GSP(P)).

### GSP(I)

21.20 GSP(I) is derived by summing the income flows accruing to factors of production, plus taxes less subsidies on production and imports:

*GSP(I)* = *Compensation of employees*
\+ *Gross operating surplus*
\+ *Gross mixed income*
\+ *Taxes on production and imports*
\- *Subsidies on production and imports*

21.21 In the state accounts GSP(I) is published in current price terms only as its components cannot be divided into price and quantity elements. GSP(I) is the basis for measurement of GSP as it is the only complete measure of current price GSP in the state accounts. As such it is a starting point for producing volume estimates of GSP(I/E) and GSP(P).

### GSP(E)

21.22 GSP(E) is derived as the sum of all final expenditures on goods and services:

*GSP(E)* = *Final consumption expenditure*
\+ *Gross fixed capital formation*
\+ *Changes in inventories*
\+ *Exports*
\- *Imports*

21.23 At the state level the expenditure measure must include both international trade and trade between states, as well as changes in inventories. Currently there is no data source available to produce interstate trade or change in inventories on a state basis.

21.24 The inability to measure interstate trade and state level changes in inventories is overcome by assuming that GSP(E) is equal to GSP(I), forming what is known as the GSP(I/E) measure. This is discussed in more detail below. Items of GSP(E) which can be measured are defined as the known components of GSP(E).

### Combined GSP(I/E) measure

21.25 GSP(I/E) is a single measure of GSP produced by assuming GSP(E) is equal to the GSP(I) measure. It is used to overcome the inability to derive all components of the GSP(E) measure. The process is to first produce a current price GSP(I/E) using the GSP(I) measure to allocate to states the average of the GSP(I) and GSP(E) measures.

21.26 A chain volume GSP(I/E) is then produced by deflating current price GSP(I/E) with a deflator produced with known components of GSP(E), which are state final demand and international trade.

21.27 Known components of GSP(I/E) are published. The difference between the known components of expenditure and the total GSP(I/E) is published as the balancing item. The balancing item, in theory, consists of interstate trade and changes in inventories.

### GSP(P)

21.28 GSP(P) is the sum of value added for all industries. Conceptually, GSP(P) is as follows:

$$GSP(P) = \text{Gross value added} + \text{Taxes on products} - \text{Subsidies on products}$$
$$= \text{Output} - \text{Intermediate consumption} + \text{Taxes on products} - \text{Subsidies on products}$$

21.29 Gross value added (GVA) is the difference between output and intermediate consumption at basic prices for each institutional unit and thereby measures the value created by production. Value added represents the contribution of labour and capital to the production process. In the state accounts, estimates for intermediate consumption are not available, meaning calculation of current price and volume GVA requires alternative estimation methods.

21.30 Current price GVA is calculated using income components, using the assumption that GSP(I) = GSP(P).

21.31 The output indicator method is used to produce chain volume (CVM) estimates of GVA. This involves extrapolating reference year estimates of current price GVA using movements of indicators of output volumes.

### Published GSP

21.32 In the state accounts, the published GSP is the average of the GSP(I/E) and GSP(P) measures. This is represented algebraically as:

$$GSP = \frac{(GSP(P) + GSP(I/E))}{2}$$

21.33 This measure maximises the use of information about state economic activity and is more stable over time than either the GSP(P) or the GSP(I/E) measure. Individual measures of GSP(P) and GSP(I/E) are not separately published in the state accounts.

### Statistical discrepancy

21.34 To reconcile the sum of the components of the various measures of GSP with the published GSP a statistical discrepancy is derived. This ensures additivity for current price estimates as well as chain volume estimates in the reference year and beyond.

21.35 The statistical discrepancy is calculated as:

$$Statistical\ discrepancy(P) = GSP - \sum components\ of\ GSP(P)$$

$$Statistical\ discrepancy(I/E) = GSP - \sum components\ of\ GSP(I/E)$$

$$Statistical\ discrepancy(I) = GSP - \sum components\ of\ GSP(I)$$

21.36 Ideally the statistical discrepancy should equal zero as all measures of GSP should be equal in concept. This is not the case in the state accounts due the lower quality of data sources at state level as well as other measurement issues.

21.37 It should be noted that the statistical discrepancy is conceptually different to the balancing item. The balancing item is representative of economic transactions such as interstate trade and inventories. As such changes in the value of the balancing items are representative of economic events and are not a reflection on the quality of the state accounts.

## GSP compilation

21.38 The process of compiling GSP in the state accounts is sequential with GSP measures for current prices and volumes interrelated. The process for compiling GSP includes the following steps:

1. Create current price GSP(I);
2. Create known components of GSP(E);
3. Combine GSP(I) and known components of GSP(E) to produce current price and volume measures of GSP(I/E);
4. Create current price GSP(P) using components of GSP(I);
5. Create volume GSP(P) using the output indicator approach;
6. Create volume GSP as an average of GSP(P) and GSP(I/E).

21.39 Current price income GSP(I) is the starting point for volume GSP(P) and GSP(I/E) measures as it is the only measure which is independently produced for current price estimates. Compilation of GSP(P) and GSP(I/E) therefore use the assumption that:

- GSP(I) = GSP(E) for current price GSP(I/E); and
- GSP(I) = GSP(P) for current price GSP(P).

21.40 Volume estimates of GSP(I/E) and GSP(P) can then be calculated, as it is not possible to produce volume estimates without a current price base. More detail on the individual steps of GSP compilation are included in following sections.

## GSP MEASURED BY THE INCOME APPROACH - GSP(I)

### Overview

21.41 GSP(I) is derived by summing the income flows from the factors of production (labour and capital). That is the sum of the factor incomes and taxes less subsidies on production and imports:

*GSP(I)* = *Compensation of employees*
\+ *Gross operating surplus*
\+ *Gross mixed income*
\+ *Taxes on production and imports*
\- *Subsidies on production and imports*

21.42 Estimates of total factor income by state are compiled by industry at the ANZSIC Division level. However, state by industry estimates are not available for GSP as industry estimates are not available at the state level for taxes less subsidies on production and imports.

#### Compensation of employees

21.43 Compensation of employees (COE) is allocated to the state of the location of employment. Data for state estimates of COE are compiled from the following ABS surveys:

- *Survey of Employment and Earnings, Public Sector, Australia* (cat. no. 6248.0.55.002); and
- *Quarterly Business Indicators, Australia* (cat. no. 5676.0).

#### Gross operating surplus and gross mixed income

21.44 Gross operating surplus and gross mixed income (GOS/GMI) is combined at the industry division level due to the lack of sector data. Estimates of GOS/GMI by industry are allocated to state using a range of output indicators. Indicators are designed to allocate GOS/GMI to where production occurs rather than based upon any ownership or head office structure.

#### Taxes less Subsidies on production and imports

21.45 Taxes less subsidies on production and imports relating to the State and local government sector are allocated directly to the state in which they are collected or paid. It is assumed that all production taxes collected by a particular state government are paid by entities resident in that state. Similarly, it is assumed that any subsidies paid by a state government are paid to resident entities of that state.

21.46 Commonwealth taxes and subsidies are allocated to state using a range of activity indicators such as household final consumption expenditure.

### Compensation of employees

21.47 State estimates of COE are produced annually and quarterly for the state accounts and also for *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0). State by industry splits of COE are also produced annually as part of compiling the state accounts.

#### Annual Compensation of employees

21.48 Annual state totals for COE are compiled for components of private and public wages and salaries as well as employer social contributions (ESC). All components are estimated using the top down approach, i.e. national benchmarks are allocated to states using source data indicators based on employer location.

21.49 The following table outlines the data sources used to estimate annual compensation of employees.

Table 21.1 Annual Compensation of employees data sources – by component

| Item | Comment |
|---|---|
| **Wages and salaries** | |
| **Private sector** | |
| **Non-farm** | Wages and salaries for private sector non-farm employees are based on annualised *Quarterly Business Indicators, Australia* (cat. no. 5676.0) (QBIS). |
| **Farm** | Farm wages and salaries are allocated to state using estimates from *Labour Force, Australia* (cat. no. 6291.0.55.001) and *Average Weekly Earnings, Australia* (cat. no. 6302.0) surveys. |
| **Public sector** | |
| **Defence** | Defence Force wages and salaries are provided from the Department of Defence. They are allocated to states using numbers of permanent military forces. |
| **Non-defence** | *Employment and Earnings, Public Sector, Australia* (cat. no. 6248.0.55.002) (SEE) is used to allocate public sector wages to states.<br><br>Payments to the staff of Australian embassies and consulates overseas are allocated to the Australian Capital Territory. The data is obtained from data from Department of Foreign Affairs and Trade (DFAT). |
| **Non-cash wages – payments in kind** | Benchmark data for state estimates of the value of fringe benefits payable to public and private sector employees are available from the periodic *Labour Costs, Australia* (cat. no. 6348.0) (SMLC). This survey is currently run every 6 years.<br><br>Estimates for the latest years, as well as for years between surveys, are moved in line with underlying wage growth for states. |
| **Employer social contributions** | GFS data is used to produce annual benchmarks for superannuation for the public sector. All other components of employer social contributions are sourced from the periodic SMLC survey.<br><br>Estimates for the latest years, as well as for years between surveys, are moved in line with underlying wage growth for states. |

Quarterly Compensation of employees

21.50 Quarterly state totals for COE are compiled for components of private and public wages and salaries as well as employer social contributions (ESC). All components are estimated using the top down approach consistent with annual estimates. Quarterly estimates are also benchmarked annual state totals to ensure that they are consistent and additive to annual totals.

21.51 The following table outlines the data sources used to estimate quarterly state compensation of employees.

Table 21.2 Quarterly Compensation of employees data sources – by component

| Item | Comment |
|---|---|
| **Wages and salaries** | |
| **Private sector** | |
| **Non-farm** | Wages and salaries for private sector non-farm employees are based on *Quarterly Business Indicators, Australia* (cat. no. 5676.0) (QBIS). |
| **Farm** | Quarterly farm wages and salaries are allocated to state using estimates |

| | |
|---|---|
| | from *Labour Force, Australia* (cat. no. 6291.0.55.001) and *Average Weekly Earnings, Australia* (cat. no. 6302.0) surveys. |
| **Public sector** | |
| **Defence** | Defence Force wages and salaries are provided from the Department of Defence. They are allocated to states using numbers of permanent military forces by state. |
| **Non-defence** | Quarterly wages for Commonwealth, state and local general government and public corporations are sourced from GFS. Commonwealth GFS estimates are split to state using weights derived from annual *Employment and Earnings, Public Sector, Australia* (cat. no. 6248.0.55.002) (SEE).<br><br>Payments to the staff of Australian embassies and consulates overseas are allocated to the Australian Capital Territory. The data is obtained from data from Department of Foreign Affairs and Trade (DFAT). |
| **Non-cash wages – payments in kind** | Estimates for quarterly payments in kind are moved in line with underlying wage growth for states. |
| **Employer social contributions** | Estimates for quarterly employer social contributions are moved in line with underlying wage growth for states. |

State by industry COE

21.52 Annual state by industry splits of COE are produced by modelling a set of state by industry COE indicators, which are based on state by industry indicators of *Labour Force, Australia, Detailed, Quarterly* (cat. no. 6291.0.55.001) and *Average Weekly Earnings, Australia* (cat. no. 6302.0).

21.53 Multiplying average weekly earnings (AWE) and number of employees from the Labour Force survey (LFS) provides an employee earnings estimate for state by industry components, that is:

Total employee earnings = Price (AWE) x Quantity (LFS)

21.54 State by industry estimated employee earnings are then transformed to a basis comparable to COE using a linear regression model. These are then used as state by industry indicators to split national industry COE totals to state.

21.55 A residual allocation is then applied to ensure additivity of the state by industry COE dissection to control totals for state and industry COE. The result is state by industry COE estimates that are consistent with state totals and national industry benchmarks.

## Gross operating surplus and gross mixed income

21.56 Gross operating surplus (GOS) is the surplus accruing from production of corporations and dwellings owned by persons. For general government, GOS is equal to consumption of fixed capital. Gross mixed income (GMI) is the surplus accruing from production of unincorporated enterprises. GOS and GMI (GOS/GMI) are not calculated separately by state due to lack of data.

21.57 The following tables outline the annual data sources used to estimate GOS/GMI. There are no quarterly estimates for GOS/GMI by State.

Table 21.3 Gross operating surplus/Gross mixed income – by industry except Agriculture, forestry and fishing (Division A) and ownership of dwellings

| Item | Comment |
|---|---|
| **Method** | Estimates of GOS/GMI by state and industry for private corporations and unincorporated enterprises are allocated to state using output indicators, that is<br>$State\ GOS/GMI = \frac{State\ ouput\ indicator}{Australian\ output\ indicator} \times Australian\ GOS/GMI$ |
| **Output indicator** | |
| **Mining** | Values of state mining production data are used to allocate mining GOS/GMI to states. |
| **Manufacturing** | National manufacturing GOS/GMI is allocated to states using an indicator derived from *Quarterly Business Indicators, Australia* (cat. no. 5676.0) (QBIS) data. |
| **Electricity, gas, water and waste services** | Private non-financial corporations and unincorporated enterprises GOS/GMI is allocated to states using an indicator derived from QBIS data.<br><br>Public non-financial corporations GOS/GMI is produced with state level public corporations GOS data sourced from Government Finance Statistics (GFS). |
| **Construction** | Total GOS/GMI is allocated to states using a composite indicator derived using the two main construction indicators, *Building Activity, Australia* (cat. no. 8752.0) and *Engineering Construction Activity, Australia* (cat. no. 8762.0). |
| **Wholesale trade** | *Quarterly Business Indicators, Australia* (cat. no. 5676.0) sales data for the wholesale trade industry is used to allocate national GOS/GMI benchmark to states. |
| **Retail trade** | Sales data by state from *Retail Trade, Australia* (cat. no. 8501.0) is used to derive an indicator to allocate national GOS/GMI to states. |
| **Accommodation and food services** | National estimates are allocated to states using an indicator derived from Household Final Consumption Expenditure (HFCE) for Hotels, Cafes and Restaurants. This data is sourced from *Accommodation Services, Australia* (cat. no. 8695.0) and QBIS data. |
| **Transport , postal and warehousing** | State and local public non-financial corporations estimates are directly allocated to states using GFS. As the activity of national public non-financial corporations crosses state borders, indirect indicators are used to allocate GOS to states. Private GOS/GMI is allocated to states using a variety of activity indicators. A combination of ERP data, QBIS data and Bureau of Infrastructure, Transport and Regional Economics (BITRE) data for road, rail and water freight, air traffic passengers are used. |
| **Information, media and telecommunication** | National GOS/GMI is allocated to states using indicators derived from QBIS sales data for private corporations and from GFS data for public sector corporations. |
| **Finance and insurance services** | Labour Force employment data by state by ANZSIC subdivision are used for the state allocation of Australian totals for GOS/GMI. |
| **Rental, hiring and real estate services** | State ratios for allocating GOS/GMI are derived from *Quarterly Business Indicators, Australia* (cat. no. 5676.0) sales data dissections. |
| **Professional, scientific and technical services** | State ratios for allocating GOS/GMI are derived from *Quarterly Business Indicators, Australia* (cat. no. 5676.0) sales data dissections. |

| | |
|---|---|
| **Administrative and support services** | State ratios for allocating GOS/GMI are derived from *Quarterly Business Indicators, Australia* (cat. no. 5676.0) sales data dissections. |
| **Public administration and safety** | There is a very small amount of private market sector activity for Division O, however there are no reliable state indicators. GFS indicator data is used on the assumption that this activity occurs in similar state proportions to general government operations. |
| **Education and training** | HFCE data on education for private education and GFS data for public education by state is used to split the Australian total for GOS/GMI by state. |
| **Health care and social assistance** | Australian estimates of GOS/GMI are calculated separately for health and for social assistance. HFCE by state for doctors, hospitals and dentists is used to allocate Health GOS/GMI by state. Movements in levels of estimated resident population (ERP) are used to allocate social assistance estimates by state. |
| **Arts and recreational services** | Public non-financial corporations GOS/GMI is allocated to states using GFS data. The private sector portion of GOS/GMI is allocated to states using indicators derived from household final consumption expenditure and estimated resident population data. |
| **Other services** | Other services GOS/GMI data are allocated using a combination of indicators. Public non-financial corporations GOS/GMI is allocated to states using GFS data. HFCE on other services is used as an indicator to derive the state split of private sector GOS/GMI. |

Table 21.4 Gross operating surplus/Gross mixed income – Agriculture, forestry and fishing (Division A)

| Item | Comment |
|---|---|
| **Method** | Derived as follows:<br>GOS/GMI = output<br>– intermediate use<br>– compensation of employees<br>– taxes on production and imports<br>+ subsidies on production and imports |
| **Data sources** | |
| **Output** | *Value of Agricultural Commodities Produced* (cat. no. 7503.0) and Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES). |
| **Intermediate use** | *Value of Agricultural Commodities Produced* (cat. no. 7503.0) and Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES). |
| **Compensation of employees** | Agriculture COE by state allocated using the top down approach using *Labour Force, Australia, Detailed, Quarterly* (cat. no. 6291.0.55.003) and *Average Weekly Earnings, Australia* (cat. no. 6302.0). |
| **Taxes less subsidies on production and imports** | Allocated using indicators such as farm COE and output. |

Table 21.5 Gross operating surplus – Ownership of dwellings

| Item | Comment |
|---|---|
| **Method** | Dwellings is derived as follows:<br>GOS I = output<br>– intermediate use<br>– compensation of employees<br>– taxes on production and imports<br>+ subsidies on production and imports |
| **Output** | The output estimate is equivalent to the estimate of household final consumption expenditure on imputed dwelling rent plus actual dwelling rent which is compiled at state level.<br><br>The data sources and methods used to compile state estimates of actual and imputed dwelling rent are described in sections on household final consumption expenditure. |
| **Intermediate use** | Intermediate use related to ownership of dwellings includes:<br>• repairs and maintenance;<br>• building insurance;<br>• real estate agent commissions charged for the management of rental properties;<br>• loan application fees, FISIM and other charges; and<br>• miscellaneous expenses.<br><br>Most of these expenses are derived from national totals using a combination of *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) data, run every 6 years, as well as state dwelling number estimates between benchmark years. |
| **Taxes less subsidies on production and imports** | Taxes less subsidies are produced largely from GFS data, relating mainly to rates and land taxes and public housing subsidies. Because these items are state and/or local in nature, they are allocated to state according to GFS.<br><br>Rates are the only other tax on production for ownership of dwellings which are allocated to states. Subsidies for public housing are state government based and are also allocated to states. There is no COE allocated to ownership of dwellings. |

Table 21.6 Gross operating surplus – General government

| Item | Comment |
|---|---|
| **Method** | General government GOS comprises only consumption of fixed capital (COFC) and is allocated to states in two parts, state totals and then an industry dissection. The total State and local government component of COFC is allocated to individual states using a simple model based on an accumulation of State and local government gross fixed capital formation since 1961-62. A similar process is also undertaken for Commonwealth government. This is a simplified version of the PIM model described in chapter 14.<br><br>State totals of COFC are then allocated to industry using government employment by state by industry from the Survey of Employment and Earnings (SEE). A residual allocation is then applied to ensure additivity of state industries to control totals of state and industry COFC totals. |

## Taxes less subsidies on production and imports

21.58 Taxes (and subsidies) on production and imports are disaggregated into two components:

3. Taxes (and subsidies) on products, which include:

- taxes that are payable on goods and services when they are produced, delivered, sold, transferred or otherwise disposed of by their producers;
- taxes and duties on imports payable when goods enter the economic territory or when services are delivered to residents by non-residents; and
- subsidies are usually payable when the goods or services are produced, sold or imported, transferred, leased, delivered or used for own consumption or own capital formation.

4. Other taxes (and subsidies) on production, which include:

- taxes related to the payroll or workforce numbers excluding compulsory social security contributions paid by employers and any taxes paid by the employees themselves out of their wages or salaries; recurrent taxes on land, buildings or other structures; some business and professional licences where no service is provided by the Government in return; taxes on the use of fixed assets or other activities; stamp duties; taxes on pollution; and taxes on international financial transactions; and
- subsidies other than those on products, including subsidies on the payroll or workforce, and may relate to the total salary bill or the employment of particular types of persons, such as handicapped persons and the long-term unemployed.

21.59 Taxes and subsidies on production and imports are classified as follows:

- Commonwealth taxes and subsidies; and
- State and local taxes and subsidies.

## Commonwealth taxes and subsidies on production and imports

21.60 Location details for individual Commonwealth taxes and subsidies on production and imports are not recorded; therefore they are allocated to states using available state indicators.

21.61 Individual Commonwealth taxes on products are allocated to state using indicator data. Commonwealth other taxes on production other than renewable energy certificates (RECs) are allocated to the states based on the allocation of total Commonwealth taxes on products.

21.62 Commonwealth subsidies are produced as total subsidies on production and imports. A global split of subsidies on products and other subsidies on production is derived by assuming the ratio of Commonwealth subsidies on products to subsidies on production and imports is the same across states.

21.63 The following tables outline how the Commonwealth taxes and subsidies on production and imports are classified on an annual basis and the indicator that is used to allocate them to the states. This allocation is not performed on quarterly data. While taxes on production and imports are disaggregated into taxes on products and other taxes on production, no attempt is made to derive a similar split for subsidies.

Table 21.7 Annual Taxes on production and imports – Commonwealth

| Tax | Type | Indicator |
|---|---|---|
| **Sales tax (pre-2000)** | Tax on products | Total HFCE |
| **GST(post-2000)** | Tax on products | HFCE incurring GST |
| **Crude oil & petroleum products** | Tax on products | HFCE Motor Vehicle Operations |
| **Excises on beer and potable spirits** | Tax on products | HFCE Alcohol & Tobacco |

| | | |
|---|---|---|
| **Excises on tobacco products** | Tax on products | HFCE Alcohol & Tobacco |
| **Excises n.e.c.** | Tax on products | Total state GVA |
| **Export, gambling & insurance taxes** | Tax on products | Total state GVA |
| **Customs duties on imports** | Tax on products | Imports of goods by state |
| **Agriculture taxes** | Tax on products | GVA of the Agriculture, forestry & fishing industry |
| **Renewable energy certificates (RECS)** | Other tax on production | Data compiled by the Clean Energy Regulator |
| **Other miscellaneous** | Other tax on production | Residual allocated to states in the state proportion of Commonwealth taxes on products (sum of above) |

Table 21.8 Annual Subsidies on production and imports – Commonwealth

| Subsidy | Indicator |
|---|---|
| **Fuel affairs and services n.e.c.** | Historic splits of fuel subsidies relating to energy grants scheme from *Mining Operations, Australia* (cat. no. 8415.0) |
| **Manufacturing** | State total factor income for manufacturing |
| **Non-urban water transport services** | Tasmanian Freight Equalisation Scheme sourced from Centrelink |
| **Non-urban rail transport freight services** | HFCE rail services consumed |
| **Non-urban rail transport passenger services** | HFCE rail services consumed |
| **Vocational training** | Unemployed Persons - Labour force survey |
| **Other labour and employment affairs** | Unemployed Persons - Labour force survey |
| **Other economic affairs** | Wholesale and retail industry total factor income |
| **Renewable energy certificates (RECS)** | Data compiled by the Clean Energy Regulator |
| **Residual** | Allocated to states based on the state shares of the sum of the subsidies above |

State and local taxes and subsidies on production and imports

21.64 State and local taxes and subsidies are assumed to be levied or paid within state of jurisdiction and as such are directly allocated to that state. These are available on a quarterly basis from GFS data, but compilation for the state accounts only occurs annually.

21.65 The following table outlines how the State and local taxes are classified (i.e. a tax on products or other tax on production). No attempt is made to split subsidies into subsidies on products and other subsidies on production.

Table 21.9 Taxes on production and imports – State and local

| Tax | Type |
|---|---|
| **Employers payroll taxes** | Other tax on production |
| **Motor vehicle taxes** | Other tax on production |
| **Land taxes** | Other tax on production |
| **Municipal & metropolitan improvement rates** | Other tax on production |
| **Other taxes** | Other tax on production |
| **Taxes on financial & capital transactions** | Tax on products |
| **Taxes on gambling** | Tax on products |
| **Taxes on insurance** | Tax on products |
| **Franchise taxes - gas products** | Tax on products |
| **Franchise taxes - petroleum products** | Tax on products |
| **Franchise taxes - tobacco products** | Tax on products |
| **Franchise taxes - liquor products** | Tax on products |
| **Franchise taxes - total franchise taxes** | Tax on products |

KNOWN COMPONENTS OF EXPENDITURE - GSP(E)

## Overview

21.66 Known components of GSP(E) are derived as the sum of final consumption expenditure, gross fixed capital formation and international exports of goods and services less international imports of goods and services (net international trade).

21.67 Known components of GSP(E) does not provide a complete measure of GSP as components such as interstate trade and change in inventories are missing. Despite this the known components of GSP(E) are used extensively to produce and analyse GSP. The process can be summarised as:

- produce the GSP(I/E) deflator;

- decompose and analyse the GSP(I/E) measure; and
- calculate the balancing item.

21.68 Calculation of GSP(I/E) and the balancing item are described in more detail in following sections.

21.69 Known components of GSP(E) are defined as:

| | | |
|---|---|---|
| *Known components of GSP(E)* | = | Household final consumption expenditure (HFCE) |
| | + | Government final consumption expenditure (GFCE) |
| | + | Gross fixed capital formation (GFCF) |
| | = | *State final demand (SFD)* |
| | + | International exports of goods and services (X) |
| | - | International imports of goods and services (M) |

21.70 The known components of GSP(E) can be summarised as State final demand (SFD) and net international trade.

## State final demand

21.71 State final demand (SFD) is the aggregate level of final consumption expenditure and gross fixed capital formation within a state over a specified period of time. SFD is defined as the final use of goods and services within a given period by households, government and businesses. That is:

SFD = Household final consumption expenditure (HFCE)
+ Government final consumption expenditure (GFCE)
+ Gross fixed capital formation (GFCF)

21.72 In simple terms SFD is the sum of private and public consumption and investment within a state.

21.73 SFD is a measure of demand in a state economy. It does not measure the source or supply of capital or consumption, therefore includes imports from other countries or states. It also excludes exports of goods and services both internationally or interstate and as such should not be used as proxy for production or GSP.

21.74 Components of state final demand (SFD) are compiled quarterly and published in *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0).

21.75 Annual estimates are published in *Australian National Accounts: State Accounts* (cat. no. 5220.0) and are consistent with the sum of the four quarters, with slight differences due to timing. A brief summary of how each of these components are allocated to state are listed below.

21.76 Components that make up SFD are included below. The conceptual basis for allocation to state as well as data sources used for this purpose varies across components.

### Household final consumption expenditure (HFCE)

21.77 HFCE is allocated by state using the primary residence of the purchaser using indicators from *Retail and Wholesale Industries, Australia: Commodities, 2005-06* (cat. no. 8624.0) and the *Household Expenditure Survey, Australia: Summary of Results* (cat. no. 6530.0).

21.78 On a quarterly basis, state components from *Retail Trade, Australia* (cat. no. 8501.0) and *Business Indicators, Australia* (cat. no. 5676.0) are used. A range of other administrative data are also used.

### Government final consumption expenditure (GFCE)

21.79 GFCE is allocated to the state where the related activity and expenditure occurs. GFCE is split between Commonwealth government and State and local (combined) government.

21.80 Commonwealth government operates across states. Where data is available consumption items are allocated directly to the location in which consumption takes place (e.g. Pharmaceutical Benefits Scheme (PBS) expenditure and university expenditure). The remainder is allocated based on indicators including estimated resident population (ERP) as well as defence and non-defence Commonwealth government employment.

21.81 It is assumed that state governments only undertake activity in their state. Similarly, local government activity is assumed to be only undertaken within the state to which the local government areas belong.

### Gross fixed capital formation

#### *Dwelling and non-dwelling construction*

21.82 This includes dwelling and non-dwelling construction, both for the public and private sectors. Fixed physical capital is allocated directly to the state in which it resides.

21.83 Private sector estimates are sourced from Building Activity Survey (BACS), Engineering Construction Survey (ECS), and *Private New Capital Expenditure and Expected Expenditure, Australia* (cat. no. 5625.0). Public sector capital formation is sourced from Government Finance Statistics (GFS).

#### *Machinery and equipment*

21.84 Machinery and equipment is allocated to the state in which the equipment is based. This is sourced from *Private New Capital Expenditure and Expected Expenditure, Australia* (cat. no. 5625.0) as well as GFS data.

21.85 Very large items such as weapons systems and commercial aircraft are not allocated to a single state. These are for the protection of all Australian citizens and are allocated to states based on estimated resident population (ERP) shares. A similar treatment is used for civil aircraft.

#### *Cultivated biological resources*

21.86 Cultivated biological resources are allocated to state based on location of livestock and orchards. This is sourced from ABS' agricultural surveys and Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) data.

#### *Intellectual property products*

21.87 Intellectual property products include computer software, research and development, and mineral exploration as well as entertainment, literary and artistic originals. These are allocated to the states as follows:

- mineral exploration – is allocated to the state in which the exploration occurs and is sourced from *Mineral and Petroleum Exploration, Australia* (cat. no. 8412.0);
- research and development – is allocated to the location of the primary research institution using data from *Research and Experimental Development, Businesses, Australia* (cat. no. 8104.0);
- computer software – is allocated based on primary location of purchase or production, largely based upon historic weights; and
- entertainment, literary and artistic originals – are allocated to state using estimated resident population (ERP).

## International trade

21.88 International trade relates to imports and exports of goods and services of a state with a destination or source outside Australia. This is divided into merchandise goods trade, and services trade. In the state accounts merchandise goods trade is produced annually and quarterly, and services trade is produced annually.

### *Trade in merchandise goods*

21.89 Trade in merchandise goods measures goods that cross the Australian customs barrier. These are allocated to state based on the location of where the customs barrier is crossed. If the goods are transported to another state this is treated as an interstate re-export, which is included in the balancing item. In the national accounts, trade in goods is produced on a Balance of payments (BOP) basis which adjusts for goods which are not captured sufficiently in customs data.

### *International trade in services*

21.90 International trade in services is collected as part of *Trade in Services by Country, by State and by Detailed Services Category* (cat. no. 5368.0.55.003). State allocation is based on the state location of units sampled as part of this survey.

## Household final consumption expenditure (HFCE) - sources and methods

21.91 Quarterly household final consumption is largely allocated to states using the top down approach by using indicators and price deflators. It is compiled according to the COICOP classification. Dwelling rent is the main exception to this and is compiled using the bottom up approach using data from Census of Population and Housing every 5 years. Adjustments for interstate and international household consumption are also made.

21.92 Annual estimates for all COICOP categories are produced as the sum of four quarters, with differences in annual and quarterly estimates due mostly to timing differences.

### Dwelling rent

21.93 Imputed and actual rent of owner-occupiers are obtained by multiplying the stock of dwellings by the average rent paid by state. Splits between owner-occupied and imputed rent are estimated using data from the Census of Population and Housing. The stocks of dwellings and the rents paid for dwellings by state are obtained from the Population Census. Imputed rent paid for owner-occupied dwellings is calculated by matching average rents reported in the Population Census for detailed level of region and housing type and multiplying this by numbers of owner-occupied dwellings.

21.94 For inter-censal and post-Census periods, the dwelling stock is moved forward using the number of dwelling unit completions by state from *Building Activity, Australia* (cat. no. 8752.0). This is then modified by a factor to take account of other changes to the stock of dwellings. Values for average rent paid is updated using data from *Housing Occupancy and Costs* (cat. no. 4130.0) and industry reports from Australian Property Monitors and the Real Estate Institute of Australia and CPI for privately-owned dwelling rents. This methodology is undertaken quarterly with annual estimates produced by summing quarterly estimates.

### Adjustments for interstate and international household consumption

21.95 Household consumption undertaken overseas or interstate by state residents is added to total HFCE. Consumption by non-state residents (international and interstate) are removed from total state HFCE. This is to ensure that HFCE is representative of state resident household consumption. This is estimated in two parts using net visitor numbers for interstate as well as international trade in services estimates.

1. International net expenditure is split to states using *International Trade in Goods and Services, Australia* (cat. no. 5368.0.55.003).

2. Interstate net expenditure is based on net interstate visitor day and night estimates which are produced by Tourism Research Australia (TRA). This is combined with average day and night rates of expenditure to produce a value.

21.96 Both these adjustments are undertaken quarterly with annual estimates produced by summing quarterly estimates.

Quarterly Indicator series, intermittent benchmarks, and volume deflators.

21.97 The table below lists the three elements required to produce state indicators for HFCE.

Table 21.10 HFCE data sources– by COICOP category

| COICOP category | Quarterly indicator series | Intermittent benchmark | Deflator |
|---|---|---|---|
| **Food and non-alcoholic beverages** | *Retail Trade, Australia* (cat. no. 8501.0) | *Retail and Wholesale Industries, Australia: Commodities, 2005-06* (cat. no. 8624.0) | Weighted average of components from the CPI Food and non-alcoholic Beverages group. |
| **Alcoholic beverages** | | | |
| **Liquor retailers** | *Retail Trade, Australia* (cat. no. 8501.0) | *Retail and Wholesale Industries, Australia: Commodities, 2005-06* (cat. no. 8624.0) | Weighted average of components from the CPI Alcoholic beverages sub-group. |
| **Other liquor** | *Business Indicators, Australia* (cat. no. 5676.0) | *Retail and Wholesale Industries, Australia: Commodities, 2005-06* (cat. no. 8624.0) | Weighted average of components from the CPI Alcoholic beverages sub-group. |
| **Cigarettes and Tobacco** | *Quarterly Business Indicators, Australia* (cat. no. 5676.0) and imports from *International Trade in Goods and Services, , Australia* (cat. no. 5368.0) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI for Tobacco. |
| **Clothing and footwear** | *Retail Trade, Australia* (cat. no. 8501.0) | *Retail and Wholesale Industries, Australia: Commodities, 2005-06* (cat. no. 8624.0) | Weighted average of components from the CPI Clothing and footwear group. |
| **Electricity, gas and other fuels** | Electricity and gas from revenue information from major retail suppliers in each state. | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | Electricity, gas and other fuels re-valued using relevant components of the CPI Utilities sub-group. |
| **Furnishings and household equipment** | *Retail Trade, Australia* (cat. no. 8501.0) | *Retail and Wholesale Industries, Australia: Commodities, 2005-06* (cat. no. 8624.0) | Weighted CPI for Furniture and household equipment |
| **Health** | | | |
| **Medicines, medical aids and therapeutic appliances** | *Retail Trade, Australia* (cat. no. 8501.0) - Medical aids and therapeutic appliances GFS for Pharmaceutical Benefits Scheme | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI for Pharmaceutical products. |

| | | | |
|---|---|---|---|
| **Hospital, ambulance services and nursing home care** | Department of Health and Ageing (DoHA) and Private Health Insurance Administration Council (PHIAC) | N/A | CPI Health group |
| **Housing, water, electricity, gas and other fuels** | | | |
| **Imputed and actual rentals for housing** | See paragraph 21.93 | See details above | Quantity revaluation |
| **Other services related to the dwelling** | Estimated resident population (ERP) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI for water and sewerage |
| **Purchase of vehicles** | Federal Chamber of Automotive Industries' VFACTS | N/A | CPI for Motor vehicles. |
| **Operation of Vehicles** | | | |
| **Fuel** | Australian Petroleum Statistics, published by the Bureau of Resource and Energy Economics (BREE) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI on Automotive fuel. |
| **All other motoring goods** | Australian Petroleum Statistics, published by the Bureau of Resource and Energy Economics (BREE) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI Private motoring sub-group. |
| **Transport** | | | |
| **Public road and rail and water transport** | GFS data from public transport authorities | N/A | Weighted CPI for rail water and road transport |
| **Air transport** | Revenue data provided by the major airlines. | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI for Air transport |
| **Communication** | | | |
| **Postal Services** | Data from Australia Post | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | Quantity revalued using Australia Post data |
| **Telecommunication services** | Revenue data obtained from the major service providers | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI for Telecommunication equipment and services. |
| **Recreation and Culture** | | | |
| **Audio visual, photographic and data processing equipment and accessories** | *Retail Trade, Australia* (cat. no. 8501.0) | *Retail and Wholesale Industries, Australia: Commodities, 2005-06* (cat. no. 8624.0) | CPI Audio, visual and computing equipment and services sub-group |

| | | | |
|---|---|---|---|
| **Recreational items and equipment** | *Retail Trade, Australia* (cat. no. 8501.0) | *Retail and Wholesale Industries, Australia: Commodities, 2005-06* (cat. no. 8624.0) | Weighted components for CPI |
| **Sporting and recreational services** | Estimated resident population (ERP) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI for Sports participation |
| **Cultural and entertainment services** | *Retail Trade, Australia* (cat. no. 8501.0) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI Recreation and culture group |
| **Gambling** | GFS taxes on gambling | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI All groups excluding medical and hospital services |
| **Education** | | | |
| **Tertiary education** | Receipts from the Higher Education Contribution Scheme (HECS) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI for Education |
| **Post-secondary education** | Estimated resident population (ERP) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI for Education |
| **Primary, secondary education and preschool** | Estimated resident population (ERP) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI for Education |
| **Hotels, catering and restaurants** | | | |
| **Catering** | *Retail Trade, Australia* (cat. no. 8501.0) and *Quarterly Business Indicators, Australia* (cat. no. 5676.0) | *Retail and Wholesale Industries, Australia: Commodities, 2005-06* (cat. no. 8624.0) | Components from the CPI |
| **Accommodation** | *Tourist Accommodation, Australia* (cat. no. 8635.0). | N/A | CPI for Domestic holiday travel and accommodation. |
| **Miscellaneous goods and services** | | | |
| **Personal care** | *Retail Trade, Australia* (cat. no. 8501.0) and *Quarterly Business Indicators, Australia* (cat. no. 5676.0) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI Furnishings, household equipment and services group |
| **Personal effects** | *Retail Trade, Australia* | *Retail and Wholesale* | Relevant components |

| | | | |
|---|---|---|---|
| | (cat. no. 8501.0) | *Industries, Australia: Commodities, 2005-06* (cat. no. 8624.0) | from the CPI |
| **Finance and Insurance** | | | |
| **Insurance** | Estimated resident population (ERP) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | Motor vehicle insurance CPI, Wage Price Index (LPI) for workers compensation and CPI all groups for all other. |
| **Finance** | Estimated resident population (ERP) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | CPI all groups |
| **Other Services** | | | |
| **Personal outlays on miscellaneous services** | Estimated resident population (ERP) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | Relevant components of the CPI and Wage Price Index (LPI) |
| **NPISH** | Estimated resident population (ERP) | *Household Expenditure Survey, Australia: Summary of Results, 2009-10* (cat. no. 6530.0) | Relevant components of the CPI and Wage Price Index (LPI) |

## Government final consumption expenditure (GFCE) – sources and methods

21.98 Estimates of GFCE are disaggregated into Commonwealth government and State and local government.

21.99 National government final consumption includes government agencies and jointly administrated universities. National GFCE is disaggregated into defence and non-defence.

21.100 Jurisdictional reporting matches regional boundaries for State and local governments. Therefore, State and local GFCE estimates are compiled using the bottom up approach. Estimates in the quarterly and annual state accounts are consistent with data published in the GFS, with the exception of timing and some conceptual differences.

21.101 The table below outlines the data sources and methods used in the estimation of quarterly GFCE by level of government. They include both the current price estimates and volume estimates.

21.102 Annual estimates are produced as the sum of quarters with differences due to timing. For GFS estimates this can be significant due to inclusion of audited GFS data from *Government Finance Statistics, Australia* (cat. no. 5512.0).This occurs for the state accounts and also for *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0).

Table 21.11 Quarterly Government final consumption expenditure – by level of government

| Item | Comment |
|---|---|
| **National defence** | |
| **Current price estimates** | Government Finance Statistics is the primary data source, which in turn is based on data from the Department of Finance and Deregulation.<br><br>The data obtained are for the expenditures on defence employees (i.e. wages and salaries and employer social contributions) and on other defence inputs (i.e. operating expenses such as rent, electricity, stationery, etc.) plus details of the value of sales of goods and services. The estimate for government expenditure on Financial Intermediation Services Indirectly Measured (FISIM) is included as part of the costs (i.e. intermediate consumption) of general government.<br><br>Consumption of fixed capital is used in place of the depreciation recorded in government accounts. Consumption of fixed capital is the preferred conceptual measure as it is compiled on a current replacement cost basis rather than the historical cost basis used to compute depreciation allowances. It is obtained from the Perpetual Inventory Model (PIM).<br><br>There are no state splits of data from GFS, with data split to states using posting location of defence employees. This is sourced from the Department of Defence. |
| **Volume estimates** | Defence employee costs are deflated using the Wage Price Index and defence materials are deflated using the Producer Price Index. |
| **National non-defence** | |
| **Universities** | |
| **Current price estimates** | Data for universities are collected from a sample of approximately 22 public universities or just over 50 per cent of the population. This provides enough detail to allow state estimates to be produced. |
| **Volume estimates** | Estimates for universities are derived by quantity revaluation using the estimated growth in the number of students in each state. For quarterly estimates this is based on trend as there is no quarterly data. |
| **Pharmaceuticals** | |
| **Current price estimates** | Pharmaceutical benefit scheme expenditure by state is produced by the Commonwealth Department of Health. This is based upon pharmacy location of subsidised medicines. |
| **Volume estimates** | Volume estimates for pharmaceuticals are price deflated using the CPI data for expenditure on pharmaceuticals. |
| **Medicare** | |
| **Current price estimates** | Medicare data is allocated to state using Commonwealth employment detail from *Employment and Earnings, Public Sector* (6248.0.55.002). |
| **Volume estimates** | Medicare estimates are quantity revalued at state level using the estimated growth in medical services (from Medicare and hospital services data). |

**Other**

**Current price estimates**

Government Finance Statistics is the primary data source, which in turn is based on data from the Department of Finance and Deregulation.

The data obtained are for the expenditures by Commonwealth agencies other than those in the Defence portfolio and by public universities on employees (i.e. wages and salaries and employer social contributions) and on other inputs (i.e. operating expenses such as rent, electricity, stationery, etc.) plus details of the value of sales of goods and services. The estimate for government expenditure on Financial Intermediation Services Indirectly Measured (FISIM) is included as part of the costs (i.e. intermediate consumption) of general government.

Consumption of fixed capital is used in place of the depreciation recorded in government accounts. Consumption of fixed capital is the preferred conceptual measure as it is compiled on a current replacement cost basis rather than the historical cost basis used to compute depreciation allowances. It is obtained from the Perpetual Inventory Model (PIM).

**Volume estimates**

All other national non-defence estimates are price deflated using an index compiled using components of the Consumer Price Index, Wage Price Index and Producer Price Index.

**State and local**

**Current price estimates**

Current price estimates are sourced from GFS data.

Data are provided according to the following components:

- health;
- education;
- redundancies; and
- superannuation.

**Volume estimates**

**Health**

Health estimates are quantity revalued using the estimated growth in medical services. Quarterly estimates are trended as data is only available annually.

**Education**

Education estimates are quantity revalued using the estimated growth in the number of students by state.

**Redundancies**

Redundancy payments for health are quantity revalued using the estimated growth in medical services. Quarterly estimates are trended as data is only available annually.

Redundancy payments for education are quantity revalued using the estimated growth in the number of students by state.

The remainder is price deflated as below using components of the Consumer Price Index, Wage Price Index and Producer Price Index.

**Superannuation**

Superannuation estimates are price deflated using indexes compiled from the Wage Price Index.

**All other**

All other State and local government estimates are price deflated using an index compiled using components of the Consumer Price Index, Wage Price Index and Producer Price Index.

## Gross fixed capital formation - sources and methods

### Dwellings

21.103 Gross fixed capital formation (GFCF) for dwellings consists of the value of acquisitions of new and existing (used) dwellings less the value of disposals of existing dwellings. State estimates are derived using the top down approach.

21.104 The following table outlines the quarterly data sources used to estimate gross fixed capital formation for dwelling construction. Annual estimates are compiled as the sum of quarterly estimates, with differences between quarterly and annual estimates due to timing.

Table 21.12 Gross fixed capital formation – dwellings

| Item | Comment |
|---|---|
| **New and used dwellings** | |
| **Current price estimates** | |
| **Private** | State splits for new and used dwellings are constructed using new residential building data from *Building Activity, Australia* (cat. no. 8752.0)(BACS). |
| **Public** | State level estimates are constructed by allocating GFS data for each state to the relevant state. Estimates for the Commonwealth jurisdiction are allocated using a proportion based on public employment from the Survey of Employment and Earnings (SEE). |
| **Volume estimates** | Total public and private sector new and used dwellings are deflated using *House Price Indexes, Eight Capital Cities* (cat. no. 6416.0). State indexes are derived as a weighted average of a price index for contract-built houses and non-contract-built houses. |
| **Alterations and Additions** | |
| **Current price estimates** | Alterations and additions to existing dwellings are estimated using data from the regular BACS and from the periodic Household Expenditure Survey (HES).<br><br>State estimates are constructed using Alterations and additions to residential buildings from BACS, this excludes estimates under $10,000. These are modelled based on data from the HES. Between HES years the under $10,000 component is assumed to move in the same proportion as items from the BACS survey. |
| **Volume estimates** | Current price estimates are deflated by applying a two quarter ending moving average of the project home price index from *House Price Indexes, Eight Capital Cities* (cat. no. 6416.0). |

### Private non-dwelling construction

21.105 Non-dwelling construction at the state level comprises of three components: new building, new engineering construction and net purchases of second-hand assets. State estimates are derived using the top down approach using data from BACS, ECS and GFS for second-hand assets.

21.106 The following table outlines the quarterly data sources used to estimate gross fixed capital formation for private non-dwelling construction. Annual estimates are compiled as the sum of quarterly estimates, with differences between quarterly and annual estimates due to timing.

Table 21.13 Gross fixed capital formation – non-dwelling construction

| Item | Comment |
|---|---|
| **New non-dwelling buildings** | |
| **Current price estimates** | The main source is the quarterly *Building Activity, Australia (cat. no. 8752.0)*(BACS). This survey covers work done on private sector owned non-residential building valued at $50,000 or more.<br><br>The following adjustments are made at the state level:<br>• for work done on non-residential building with an approval value of less than $50,000;<br>• where approvals are not obtained such as for farm buildings; and<br>• for services involved in the construction of the building such as architectural fees. |
| **Volume estimates** | State-specific price indexes are derived as a three quarter ending moving average of new building price indexes. |
| **New engineering construction** | |
| **Current price estimates** | The main source is *Engineering Construction Activity, Australia (cat. no. 8762.0)*(ECS).<br><br>As farm non-dwelling construction is not included in the ECS, adjustments are made to capital formation to estimate expenditure of farm non-dwelling construction. |
| **Volume estimates** | Current price estimates are deflated using a composite of price indexes for roads, dams, sewerage, electricity infrastructure and telecommunications infrastructure. For all but road construction, these price indexes are derived for Australia only.<br><br>The price indexes used are from the *Producer Price Indexes, Australia* (cat. no. 6427.0), Wage *Price Index, Australia* (cat. no. 6435.0) and the *Consumer Price Index, Australia (cat. no. 6401.0)*. |
| **Net purchases of second-hand assets** | |
| **Current price estimates** | The estimates from both the BACS and the ECS are adjusted to reflect net purchases of second-hand assets from the public sector by using Government Finance Statistics data. |
| **Volume estimates** | Current price estimates are deflated for each state using the state-specific implicit price deflator for the aggregate of private new non-dwelling building and new engineering construction. |

Machinery and equipment

21.107 Gross fixed capital formation (GFCF) in machinery and equipment is recorded as the value of the acquisitions of new and existing machinery and equipment, less the value of the disposals of existing machinery and equipment.

21.108 At state level private gross fixed capital formation of machinery and equipment is published with two sub-components: new machinery and equipment and net purchases of second-hand assets.

21.109 The following table outlines the quarterly data sources used to estimate gross fixed capital formation for machinery and equipment. Annual estimates are produced as the sum of four quarters, with differences in annual and quarterly estimates due mostly to timing differences.

Table 21.14 Gross fixed capital formation – machinery and equipment

| Item | Comment |
|---|---|
| **New machinery and equipment** | |
| **Current price estimates** | State splits are sourced from Survey of New Capital Expenditure (*Private New Capital Expenditure and Expected Expenditure, Australia*, (cat. no. 5625.0)). This survey excludes a number of industries for which adjustment are made including:<br>• Agriculture, forestry and fishing industry - import statistics from *International Merchandise Imports, Australia* (cat. no. 5439.0)<br>• Public administration and safety, Education and training and Health care and social assistance industries are produced annually from GFS data, with estimates modelled quarterly. |
| **Volume estimates** | Current price estimates of GFCF for new machinery and equipment are deflated using state-specific chain price indexes derived from the *Consumer Price Index, Australia* (cat. no. 6401.0), *Producer Price Indexes, Australia* (cat. no. 6427.0), *International Trade Price Indexes, Australia* (cat. no. 6457.0) and several price indexes from overseas, including the US Bureau of Economic Analysis hedonic computer price index. |
| **Net purchases of second-hand equipment** | |
| **Current price estimates** | Net purchase of second-hand assets includes:<br>• net purchases of second hand assets from the public sector from GFS data;<br>• used motor vehicle sales from businesses to households is allocated to states from national ABS Survey of Motor Vehicle Use and motor vehicle sales data available through the VFACTS service; and<br>• used equipment sold overseas (which is deducted from private GFCF). Estimates of merchandised goods are used to value used equipment sold overseas. |
| **Volume estimates** | Current price estimates of GFCF for net purchases of second-hand machinery and equipment are deflated using state-specific chain price indexes derived from the *Consumer Price Index, Australia* (cat. no. 6401.0), *Producer Price Indexes, Australia* (cat. no. 6427.0), *International Trade Price Indexes, Australia* (cat. no. 6457.0) and several price indexes from overseas, including the US Bureau of Economic Analysis hedonic computer price index. |

Intellectual property products

21.110 Gross fixed capital formation (GFCF) of research and development (R&D) is allocated to the state in which the research work occurs.

21.111 Mineral and petroleum exploration is the value of expenditure on exploration for mineral and petroleum undertaken in each state. Exploration expenditure covers all exploration activity undertaken on land and in state territorial waters, with offshore exploration in Commonwealth waters allocated to closest state of proximity.

21.112 The following table outlines the quarterly data sources used to estimate gross fixed capital formation for intellectual property products. All items with the exception of mineral and petroleum exploration are compiled annually with interpolation used to create quarterly estimates.

Table 21.15 Gross fixed capital formation – quarterly intellectual property products

| Item | Comment |
|---|---|
| **Research and development** | |
| **Current price estimates** | Interpolation of annual estimates. |
| **Volume estimates** | The volume of capital expenditure on R&D is calculated by deflating the cost based expenditure values. These current price estimates are deflated using price indexes for labour inputs and other current expenditure used as inputs into the R&D products. This is undertaken at state level. Quarterly estimates for state, like national, are calculated using trend. |
| **Mineral and petroleum exploration** | |
| **Current price estimates** | Quarterly estimates are obtained from *Mineral and Petroleum Exploration, Australia* (cat. no. 8412.0). |
| **Volume estimates** | Current price estimates are deflated using a composite price index of the Wage Price Index (for the Mining Division) (from *Wage Price Index, Australia* (cat. no. 6345.0)) and the Producer Price Index (for equipment and material categories associated with exploration—steel pipes and tubes, non-ferrous pipe fittings, iron and steel casting and forging, and other industrial machinery) (from *Producer Price Indexes, Australia* (cat. no. 6427.0)). |
| **Computer software** | |
| **Current price estimates** | Interpolation of annual estimates. |
| **Volume estimates** | Volume estimates are produced by deflating current prices estimates with the Manufacturing Industry (APMI) price index. |
| **Entertainment, literary and artistic originals** | |
| **Current price estimates** | Interpolation of annual estimates. |
| **Volume estimates** | Volume estimates are produced by deflating current prices estimates using a combination of data from *Price Indexes of Articles Produced by Manufacturing Industry, Australia* (cat. No. 6412.0), the Producer Price Indexes and the Consumer Price Index. |

21.113 The following table outlines the annual data sources used to estimate gross fixed capital formation for intellectual property products.

Table 21.16 Gross fixed capital formation – annual intellectual property products

| Item | Comment |
|---|---|
| **Research and Development** | |
| **Current price estimates** | State estimates for both own account R&D expenditure and R&D undertaken on contract by other institutions are derived from the Survey of Research and Experimental Development published in *Research and Experimental Development, Businesses, Australia* (cat. no. 8104.0), *Research and Experimental Development, Government and Private Non-Profit Organisations, Australia* (cat. no. 8109.0), *and Research and Experimental Development, Higher Education Organisations, Australia* (cat. no. 8111.0). |
| **Volume estimates** | The volume of capital expenditure on R&D is calculated by deflating the cost based expenditure values. These current price estimates are deflated using price indexes for labour inputs and other current |

| | |
|---|---|
| | expenditure used as inputs into the R&D products. This is undertaken at state level. Quarterly estimates for state, like national, are calculated using trend. |
| **Mineral and petroleum exploration** | |
| **Current price estimates** | The sum of quarterly estimates are obtained from *Mineral and Petroleum Exploration, Australia* (cat. no. 8412.0). |
| **Volume estimates** | Current price estimates are deflated using a composite price index of the Wage Price Index (for the Mining Division) (from *Wage Price Index, Australia* (cat. no. 6345.0)) and Producer Price Index (for equipment and material categories associated with exploration—steel pipes and tubes, non-ferrous pipe fittings, iron and steel casting and forging, and other industrial machinery) (from *Producer Price Indexes, Australia* (cat. no. 6427.0)). |
| **Computer software** | |
| **Current price estimates** | State estimates are derived by allocating national estimates using fixed weight splits produced largely from historic surveys for in house software, as well as packaged software imports for the off-the-shelf component. |
| **Volume estimates** | Volume estimates are produced by deflating current prices estimates with the Manufacturing Industry (APMI) price index. |
| **Entertainment, literary and artistic originals** | |
| **Current price estimates** | State estimates of GFCF of entertainment, library and artistic originals are allocated from the national estimates using Estimated Resident Population (ERP). |
| **Volume estimates** | Volume estimates are produced by deflating current prices estimates using a combination of data from *Price Indexes of Articles Produced by Manufacturing Industry, Australia* (cat. No. 6412.0), the Producer Price Indexes and the Consumer Price Index. |

Ownership transfer costs

21.114 Ownership transfer costs at state level consist of the following components:

- fees paid to lawyers associated with the transfer of ownership;
- fees and commissions paid to real estate agents, auctioneers, architects, surveyors, engineers and valuers;
- stamp duty;
- Titles Office charges; and
- local government charges.

21.115 The following table outlines the quarterly data sources used to estimate gross fixed capital formation for ownership transfer costs. Annual estimates are produced as the sum of four quarters, with differences in annual and quarterly estimates due mostly to timing differences.

Table 21.17 Gross fixed capital formation – ownership transfer costs

| Item | Comment |
|---|---|
| **Ownership transfer costs** | |
| **Current price estimates** | Stamp duty estimates are based on quarterly data from each state government. Titles Office estimates are based on the number of Land Title Transfer transactions occurring in each state for the quarter and local government charges are estimated from the number of transactions occurring in each quarter.<br><br>Real estate agents' commissions and lawyers' fees are derived from movements in a composite indicator based on state data for the number and value of real estate transactions.<br><br>Data on the number of transactions and average sale prices are obtained from State Titles Offices (Land Title Transfers) and Valuers-General Departments (Average Sale Prices). |
| **Volume estimates** | Volume estimates for ownership transfer costs are derived by quantity revaluation at the state level, by multiplying the number of transactions by the average price in the previous year. |

Cultivated biological resources

21.116 Cultivated biological resources data are compiled by state for animal resources (livestock), as well as crop and plant resources yielding repeat products (orchard growth).

21.117 The following table outlines the quarterly data sources used to estimate gross fixed capital formation for cultivated biological resources. Annual estimates are produced as the sum of four quarters, with differences in annual and quarterly estimates due mostly to timing differences.

Table 21.18 Gross fixed capital formation – quarterly cultivated biological resources

| Item | Comment |
|---|---|
| **Livestock** | |
| **Current price estimates** | Livestock uses sheep and cattle numbers adjusted slaughtering and exports from *Livestock Products, Australia* (cat. no. 7215.0) at state level.<br><br>Data on acquisition and disposal prices of other animals are calculated using the *Agriculture Commodities* publication from ABARES. Values for sheep and cattle are estimated by multiplying the number of animals by an average price per head. |
| **Volume estimates** | Quantity revalued using ABARES data on herd size. |
| **Orchard growth** | |
| **Current price estimates** | Orchard growth is estimated using number of trees and hectares of vines. These data are available annually from the ABS publication *Agricultural Commodities, Australia* (cat. no. 7121.0).<br><br>The current price value is derived by applying average costs incurred in the planting and growing of orchards to this data. |
| **Volume estimates** | Quantity revalued using number of trees and hectares of vines data outlined above. |

Public corporations

21.118 Public corporations capital formation is split into Commonwealth, and State and local.

21.119 The following table outlines the quarterly data sources used to estimate gross fixed capital formation for public corporations. Annual estimates are produced as the sum of quarters with differences due to timing. For GFS estimates these timing differences can be significant due to inclusion of audited GFS data from *Government Finance Statistics, Australia* (cat. no. 5512.0).These timing differences arise in the state accounts and also in *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0).

Table 21.19 Gross fixed capital formation – public corporations

| Item | Comment |
|---|---|
| **Commonwealth** | |
| **Current price estimates** | Government Finance Statistics provides estimates for GFCF of Commonwealth public corporations. This is allocated to states using Commonwealth employment splits from *Employment and Earnings, Public Sector* (cat. no. 6248.0.55.002). |
| **Volume estimates** | Volume estimates are price deflated from current price estimates above. Deflation is performed using composite deflators of price indexes and their weights according to the following:<br>• computer software;<br>• research and development; and<br>• all other capital formation. |
| **State and local** | |
| **Current price estimates** | Government Finance Statistics provides current price GFCF for state and local public corporations. |
| **Volume estimates** | Volume estimates are compiled from current price estimates using price deflation. Deflation is performed using composite deflators of price indexes and their weights according to the following:<br>• computer software;<br>• research and development; and<br>• all other capital formation. |

General government

21.120 General government capital formation is allocated to Commonwealth and State and local government using data from GFS. Commonwealth is further separated into defence and non-defence.

21.121 The following table outlines the quarterly data sources used to estimate gross fixed capital formation for general government. Annual estimates are produced as the sum of quarters with differences due to timing. For GFS estimates these timing differences can be significant due to inclusion of audited GFS data from *Government Finance Statistics, Australia* (cat. no. 5512.0).These timing differences arise in the state accounts and also in *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0).

Table 21.20 Gross fixed capital formation – general government

| Item | Comment |
|---|---|
| **National defence** | |
| **Current price estimates** | Government Finance Statistics is the source for defence GFCF. Defence GFCF for fixed assets is allocated to states using posting location of defence personnel.<br><br>State splits are provided for some categories of GFCF including:<br>• dwellings;<br>• non-dwelling construction; and<br>• machinery and equipment.<br><br>Intellectual property products are allocated to states using posting location of defence personnel.<br><br>Defence weapons systems are allocated using estimated resident population (ERP) data. |
| **Volume estimates** | The volume estimates are compiled from current price estimates using price deflation. Deflation is performed using composite deflators of price indexes and their weights according to the following:<br>• computer software;<br>• research and development; and<br>• all other capital formation. |
| **National non-defence** | |
| **Current price estimates** | Government Finance Statistics provides estimates for GFCF for Commonwealth general government. This is allocated to states using Commonwealth employment splits from *Employment and Earnings, Public Sector* (cat. no. 6248.0.55.002). University GFCF is also sourced from Government Finance Statistics, and is directly allocated based upon state location of universities.<br><br>Intellectual property products are allocated to states based on Commonwealth employment detail. |
| **Volume estimates** | The volume estimates are compiled from current price estimates using price deflation. Deflation is performed using composite deflators of price indexes and their weights according to the following:<br>• computer software;<br>• research and development; and<br>• all other capital formation. |
| **State and local** | |
| **Current price estimates** | GFS data for GFCF are produced at the jurisdiction level and are used for state and local current price estimates. |
| **Volume estimates** | The volume estimates are compiled from current price estimates using price deflation. Deflation is performed using composite deflators of price indexes and their weights according to the following:<br>• computer software;<br>• research and development; and<br>• all other capital formation. |

### International trade in goods and services – sources and methods

21.122 International trade in merchandise goods are allocated to state based on the location at which the customs barrier is crossed.

21.123 Published state level merchandise goods trade is not consistent with trade estimates for the national accounts which is produced on a balance of payments basis. The differences are mostly due to balance of payments (BOP) adjustments which are not currently published in the state accounts.

21.124 For unpublished estimates in the state accounts, BOP adjustments are allocated to state based on available information. BOP adjusted imports and exports are then used as part of the calculation of GSP(I/E). This ensures that:

- imports for large capital items are matched to state capital formation;
- state price deflator weights accurately reflect economic events; and
- GSP is additive to Australia GDP in current price as well as latest years' chain volume estimates.

21.125 The difference between state merchandise trade and state allocations on a BOP basis is currently included as part of the balancing item.

21.126 BOP adjustments can be divided in to:

- timing adjustments;
- coverage adjustments;
- processing adjustments; and
- classification adjustments.

21.127 BOP adjustments are applied directly if information permits. The two other alternate methods involve use of Estimated Resident Population (ERP) or splits derived from Merchandise goods data.

#### Direct allocation of BOP adjustments

21.128 Direct allocation of BOP adjustments is undertaken where sufficient information is available to do so.

21.129 For example progress payments where project level data allows allocation to states to ensure that capital imports match capital formation. The other major example is the Joint Petroleum Development Area (JPDA) for which activity is excluded from merchandise trade, but allocated to the Northern Territory to produce trade on a BOP basis. Direct allocation is used for only a small number of total BOP adjustments, but currently comprise approximately 80% of BOP adjustments by value.

#### ERP-based splits

21.130 Large mobile capital imports not included in merchandise trade are allocated to states using ERP data. This includes civil aircraft, satellites and weapons systems.

#### Merchandise goods basis splits

21.131 This process allocates BOP adjustments to state using underlying state merchandise trade as an indicator. For example, BOP adjustment for Standard International Trade Classification (SITC) sub-division 03 (fish products) are allocated to state using merchandise trade of the same category. This is the default method for allocating goods to state which there is no alternative is available.

21.132 The following tables outline the data sources and methods used to estimate international trade in goods and services.

Table 21.21 International trade – goods

| Item | Comment |
|---|---|
| **Quarterly current price estimates** | Current price estimates published in the state accounts are consistent with data published in *International Trade in Goods and Services, Australia* (cat. no. 5368.0). Small differences result from differing treatment of international re-exports as well as timing differences between publications. |
| **Annual current price estimates** | Produced as the sum of four quarters above. |
| **Annual current price BOP adjustments** | Australia level estimates are sourced from *Balance of Payments and International Investment Position, Australia* (cat. no. 5302.0). |
| **Annual and quarterly volume estimates - exports** | Annual and quarterly state merchandise goods exports and related BOP adjustments for volume are compiled at the two digit Standard International Trade Classification level, which includes around 70 categories.<br><br>Annual volume BOP adjustments at the two digit Standard International Trade Classification level are compiled consistently with related merchandise trade components.<br><br>For homogenous export commodities, the volume measures are obtained by quantity revaluation, using quantity information recorded from customs data. This largely applies to mineral and agricultural commodities, including iron ore, coal, gas and wheat.<br><br>For non-homogenous commodities current price values are deflated using data from *Export Price Index, Australia* (cat. no. 6405.0) and *Price Indexes of Articles Produced by Manufacturing Industry, Australia* (cat. no. 6412.0).<br><br>In general there are no state-based price indexes at the product level, with the assumption being made that export prices don't vary across states for product groups. |
| **Annual and quarterly volume estimates - imports** | Annual and quarterly state merchandise good imports and related BOP adjustments for volume are compiled according to the Balance of Payments Broad Economic Category (BoPBEC), which includes over 100 categories.<br><br>Annual volume BOP adjustments at the BoPBEC category level are compiled consistently with related merchandise trade components.<br><br>Current price values are deflated using data from *Import Price Index, Australia* (cat. no. 6414.0) except for computer equipment which is deflated using the (exchange rate adjusted) computer equipment price index from the U.S. Bureau of Economic Analysis and an international price index for sea transport equipment. |

Table 21.22 International trade – services

| Item | Comment |
|---|---|
| **Current price estimates** | Current price international trade in services data is allocated to state using data from *International Trade in Services by Country, by State and by Detailed Services Category* (cat. no. 5368.0.55.003). These estimates are benchmarked to national estimates of international trade in services. |
| **Volume estimates** | Volume measures are obtained by deflation of the current price values, using relevant ABS price indexes underlying those published in:<br>• *Consumer Price Index, Australia* (cat. no. 6401.0);<br>• *Price Indexes of Articles Produced by Manufacturing Industries, Australia* (cat. no. 6412.0); and<br>• *Wage Price Index, Australia* (cat. no. 6345.0). |

## GSP(I/E) MEASURE

21.133 The GSP(I/E) is a derived income and expenditure measure used to overcome the inability to derive all components of the GSP(E) measure. This relies on the assumption that GSP(E) is equal to GSP(I).

21.134 The compilation of the GSP(I/E) measure involves a number of steps:

1. Derive current price GSP(I);
2. Assume GSP(I) equals GSP(E) and obtain current price GSP(I/E);
3. Aggregate known components of GSP(E) (i.e. state final demand and international trade), for current price and volume estimates;
4. Calculate adjustments to known components of GSP(I/E) for current price and volume estimates. These are largely modelled estimates which are added to ensure price deflators more accurately reflect state economies;
5. Calculate volume and current price aggregates for adjusted known components of GSP(E). This involves adding adjustment calculated as part of step 4 to aggregate known components of GSP(E) in step 3;
6. Produce an implicit price deflator (IPD) using adjusted known components of GSP(E) created as part of step 5;
7. Apply the IPD (from step 6) to the current price GSP(I/E) to derive GSP(I/E) in volume terms;
8. Create balancing item as a residual of GSP(I/E) and known components of GSP(E) for current price and volume components.

### GSP(I/E) current price

21.135 Current price GSP(I/E) is produced by assuming GSP(I) is equal to GSP(E) (which cannot currently be measured entirely using available data sources). This relies on the national accounts where for balanced supply-use years GDP(I) is equal to GDP(E). GSP(I) is then used to allocate GDP to states to produce current price GSP(I/E).

21.136 For the current year and pre-supply-use years, where GDP(I) is not equal to GDP(E), GSP(I/E) is benchmarked to the average of current price GDP(I) and GDP(E), that is:

1. create Australia level GDP(I/E):

$$GDP(I/E) = \frac{GDP(E) + GDP(I)}{2}$$

2. benchmark the state income measure to the above GDP(I/E) measure:

$$GSP(I/E) = \frac{GSP(I)}{\text{GDP(I)}} \times GDP(I/E)$$

### Known components of GSP(E)

21.137 Current price and volume known components of GSP(E) are aggregated as the sum of state final demand, net international merchandise trade in goods and net trade in services.

Known components of GSP(E) = State final demand (SFD)

+ Net international trade in merchandise goods (exports – imports)

+ Net international trade in services (exports – imports)

21.138 Four adjustments are made to known components of GSP(E) to produce adjusted known components of GSP(E):

- net HFCE interstate;
- net BOP adjustments to international merchandise goods trade (exports – imports);
- modelled net interstate trade in goods; and
- modelled interstate re-exports/imports.

21.139 Adjusted known components of GSP(E) is calculated as:

Adjusted known components of GSP(E) = known components of GSP(E)

- net HFCE interstate

+ net BOP adjustments to international merchandise goods trade

+modelled net interstate trade in goods

+ modelled interstate re-exports/imports.

21.140 Sources and methods for calculating these components are described below. None of these items are published directly due to quality and confidentiality concerns with the data. Despite these concerns, removing these adjustments would adversely affect the quality of the GSP(I/E) price deflator. Calculation of the GSP(I/E) deflator is the main reason why these adjustments to known components of GSP(E) are applied.

#### *Net interstate expenditure adjustment*

21.141 A net interstate expenditure adjustment is made to HFCE to ensure that HFCE is representative of state resident household consumption. This adjustment is offset as part adjustments to known GSP(E) item as net interstate expenditure is representative of interstate trade, and hence should be reflected in the GSP(I/E) price deflator.

21.142 This treatment is similar to that in the national accounts, where consumption by international visitors is not included as part of HFCE. The value of this is then added to GSP as part of exports of services.

*Balance of payments adjustments to international merchandise goods trade*

21.143 Known components of GSP(E) include trade in goods on a merchandise trade basis rather than the more conceptually correct balance of payments basis. Balance of Payments adjustments are allocated to state as described in paragraph 21.132. These adjustments are made to known components of GSP(E) to ensure that balance of payments adjustments are represented in the GSP(I/E) deflator.

*Modelled net interstate trade in goods*

21.144 Interstate trade in goods relate to interstate imports and exports of domestically produced goods. The value of interstate imports and exports of goods are sourced for Queensland from the publication *Interstate Trade, Queensland* (cat. no. 8502.3). For the remaining states, indicators of interstate exports and imports are derived using activity indicators to extrapolate historic estimates produced by the Monash University Centre of Policy Studies in 1987. This assumes that state relativities have not changed in this time.

*Modelled interstate re-exports/imports*

21.145 Interstate re-exports/imports occur when the state of final destination of international trade is different to the state in which goods cross the customs barrier. Similarly to interstate trade in goods, this estimate is produced by extrapolating historic estimates produced by the Monash University Centre of Policy Studies in 1987 using volume indicators of international trade.

## Volume GSP(I/E)

21.146 A volume measure of GSP(I/E) is created by deflating current price GSP(I/E) with the GSP(I/E) deflator.

$$Volume\ GSP(I/E) = \frac{current\ price\ \ GSP(I/E)}{GSP(I/E) Deflator}$$

### GSP(I/E) Deflator

21.147 A price deflator for GSP(I/E) is created using current price and volume estimates of adjusted known components GSP(E).

21.148 The GSP(I/E) implicit price deflator is calculated as:

$$GSP(I/E)\ IPD = \frac{current\ price\ Adjusted\ known\ components\ GSP(E)}{chain\ volume\ Adjusted\ known\ components\ GSP(E)}$$

## The balancing item

21.149 In the ABS publication *Australian National Accounts: State Accounts* (cat. no. 5220.0) the balancing item has a slightly different meaning than the balancing item in the ASNA. The balancing items in the ASNA are key macroeconomic indicators (see paragraph 3.32) whereas in the state accounts the balancing item is the difference between known components of GSP(E) and GSP(I/E). The balancing item implicitly comprises total net interstate trade in goods and services, changes in inventories and other miscellaneous components.

21.150 Other miscellaneous components of the balancing item are generally items that are not covered in GSP(E) known components, due to measurement or other issues. An example is BOP adjustments to merchandise trade which are included as part of the balancing item. There are other measurement issues at state level which cannot be identified.

21.151 The balancing item is calculated as follows for both current price and volume components:

Balancing item = GSP(I/E) – Known components of GSP(E)

21.152 The balancing item is broken up further into identified and unidentified components. The identified components are estimated but are not published due to confidentiality or quality concerns.

### Identified component

21.153 The identified component of the balancing item includes some items for which estimates are produced, but are not of sufficient reliability to publish. The following are calculated as part of the adjustment to known components of GSP(E):

- net HFCE interstate;
- net BOP adjustments to international merchandise goods trade;
- modelled net interstate goods trade; and
- modelled interstate re-exports/imports.

21.154 Additionally estimated are:

- changes in inventories; and
- balancing item discrepancy.

### Changes in inventories

21.155 Changes in inventories are split using the top down approach at an industry level to states based on state GVA for these industries. State splits of changes in inventories are only produced for analytical purposes and are not published.

### Balancing item discrepancy

21.156 The balancing item discrepancy is the allocation of the national statistical discrepancy across the states. This ensures consistency between the sum of the states and Australia. It is allocated to states based upon state shares of GSP(I) for both current price and volume estimates.

### Unidentified component

21.157 The unidentified component of the balancing item is calculated residually as follows:

Unidentified component = Total balancing item

– Identified components

21.158 The unidentified component conceptually represents interstate trade in services, but it also embodies any remaining discrepancies that occur across state measures of expenditure and income due to underlying measurement issues.

## GSP MEASURED BY THE PRODUCTION APPROACH – GSP(P)

### Overview

21.159 GSP measured by the production approach is the sum of gross value added for all ANZSIC06 industries and taxes less subsidies on products across states. GSP(P) is calculated in both current prices and volumes. GSP(P) is calculated as follows:

GSP(P) = gross value added (GVA) by industry
+ taxes on products
– subsidies on products

21.160 GVA for an industry is defined as the output of goods and services produced less intermediate use of the goods and services used in the creation of that output:

Gross value added (GVA) by industry = Output
– Intermediate use

21.161 Taxes and subsidies on products relate to those which have a direct effect on production and can be attributed to an individual product.

21.162 Due to data limitations at the state level, neither current price or volume estimates of GVA can be produced as components of GVA (i.e. output and intermediate use). Current price estimates of GVA are derived from components of GSP(I). Volume estimates of GVA are generally derived using the output indicator method.

21.163 Compilation of GSP(P) for current price and volume estimates can be summarised as:

1. Derive current price GSP(I) industry components of COE and GOS/GMI;
2. Allocate other taxes less subsidies on production to industry;
3. Compile Current price GVA by industry as sum of COE, GOS/GMI, and other taxes less subsidies on production;
4. Produce volume output indicators or indexes by industry;
5. Create volume GVA using output indicators from step 4. This occurs by extrapolating reference year estimates of current price GVA using movements in a volume indicator from step 4; and
6. Create volume and current price GSP(P) by incorporating taxes less subsidies on products.

### Current price GVA

21.164 Current price estimates of GVA are compiled from income GSP(I) components as follows:

Current price GVA = Compensation of employees
+ Gross operating surplus and gross mixed income
+ Other taxes on production
– Other subsidies on production

21.165 Industry allocation of GOS/GMI is described in tables 21.3 to 21.5 and industry allocation of COE is described in paragraphs 21.52 to 21.55. Industry allocation of other taxes less subsidies on production are undertaken for the calculation of current price industry GVA.

### Industry allocation of other taxes less subsidies on production

21.166 Other taxes less subsidies on production are allocated to industry for the calculation of current price estimates. This is produced by allocating state taxes and subsidies using a top down approach to produce a state by industry matrix.

21.167 The following table outlines how other taxes and subsidies on production are allocated to industry.

Table 21.23 Allocation of other taxes and subsidies on production to industry

| Tax/subsidy | Industry allocation |
|---|---|
| **Employers payroll taxes** | COE by industry excluding Division O (Public Administration and Defence) |
| **Motor vehicle taxes** | Allocated using weights from supply and use tables |
| **Land taxes** | Allocated using weights from supply and use tables |
| **Municipal & metropolitan improvement rates** | 60% to dwellings, with the remainder allocated using weights from supply and use tables |
| **Renewable energy certificates (RECS) - taxes** | Data provided by the Clean Energy Regulator |
| **Other miscellaneous taxes** | Allocated using proportions derived from the sum of the other taxes described above |
| **Subsidies on dwellings** | Allocated directly to ownership of dwellings industry |
| **Renewable energy certificates (RECS) - subsidies** | Data provided by the Clean Energy Regulator |
| **Other miscellaneous subsidies** | Allocated to industry based on national allocation of all other subsidies to industry |

21.168 The above components are aggregated as taxes less subsides for state by industry. A residual allocation is then applied to ensure additivity of state industries to control totals of state and industry other taxes less subsidies totals.

### Taxes less subsidies on products

21.169 Current price Commonwealth and state and local taxes and subsidies on products are compiled as part of producing taxes less subsidies on production for GSP(I) as described earlier. Taxes less subsidies on products for GSP(P) comprise four components:

Taxes less subsidies on products = Commonwealth taxes on products

- Commonwealth subsidies on products

+ State and local taxes on products

- State and local subsidies on products

Table 21.24 Components of Taxes less subsidies on products

| Component | Source |
|---|---|
| **Commonwealth taxes on products** | Total Commonwealth taxes are sourced from GFS data. These are allocated to state using state indicators. See table 21.7 for details on indicators used. |
| **Commonwealth subsidies on products** | Total Commonwealth subsidies are sourced from GFS data. The allocation to state is performed using state dissections of Commonwealth subsidies on production and imports. There is no attempt to split Commonwealth subsidies between products and other production, with the assumption that state allocation doesn't vary across these two components of Commonwealth subsidies. Indicators used for state allocation of Commonwealth subsidies on production and imports are described in table 21.8. |
| **State and local taxes on products** | Sourced directly from GFS data. State and local taxes and subsidies are assumed to be levied or paid within state of jurisdiction and are allocated to that state. |
| **State and local subsidies on products** | Sourced directly from GFS data. State and local taxes and subsidies are assumed to be levied or paid within state of jurisdiction and are allocated to that state. |

## Chain volume (CVM) GVA

21.170 The output indicator method is used to compile all industries in the state accounts with the exception of agriculture. This involves extrapolating reference year estimates of current price GVA using movements in volume indicators of output. There are two basic approaches for producing volume indicators: price deflation and quantity revaluation. (See paragraphs 6.42 to 6.48 for more detail.)

21.171 Application of the output indicator method for the state accounts can be summarised in the steps below:

1. Produce a set of industry volume output indicators.

Output indicators are usually sales or turnover data for an industry, industry sub-divisions or commodity. Output indicators in the state accounts are designed to be indicative of state location of productive activity.

Output indicators are generally current price estimates which are then deflated to produce the required volume indicators. Volume output indicators are created using either price deflation or quantity revaluation. Quantity revaluation is used when there are individual commodities that are reasonably homogeneous in content and are not subject to quality change. Price revaluation is used for remaining indicators where this is not the case.

An aggregate output volume indicator is created for each industry by weighting together volume output indicators compiled at sub-division or commodity level using underlying current price weights.

2. Weight indicators to current price GVA in the reference year.

State volume growth rate indicators are weighted using state current price GVA in the reference year, where current price and volume estimates are equal.

This ensures that volume output indicators produced above are weighted consistently across state industries, which is important for following steps of aggregation and benchmarking. This step has no effect on volume growth rates of individual industries.

3. Benchmark to annual national CVM levels.

Weighted volume indicators by industry produced as part of step 2 are used to split national volume GVA to state. This process is known as benchmarking and produces state GVA consistent with national accounting concepts.

21.172 Steps 2 and 3 transform state by industry volume output indicators to state GVA consistent with estimates produced for the national accounts. These steps rely on relationships between components of output, intermediate use and output indicators calculated in the national accounts. This relies on assuming that the relationships between volume indicators and output are consistent across states; and the relationship between intermediate use and output does not vary across states.

## Gross Value Added sources and methods

21.173 The following table outlines the data sources and methods used in the estimation of annual gross value added by industry.

Table 21.25 Gross value added by industry, current price and volume – Agriculture

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | Agricultural output estimates are allocated to state from national estimates at the commodity level using the top down approach. Detailed commodity data is available from *Value of Agricultural Commodities Produced* (cat. no. 7503.0) with a one year lag. Latest year estimates are produced using output indicators from Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES).<br><br>Agriculture at state level is compiled for the following products:<br>• livestock;<br>• milk, eggs and honey;<br>• wool;<br>• cereal grains;<br>• barley, oats, rice, sorghum & cereal grains n.e.c.;<br>• other grains n.e.c.;<br>• fodder & grass;<br>• plants & flowers;<br>• sugar cane; and<br>• other agriculture (includes cotton, wine grapes and hops).<br><br>Livestock agistment services and non-agricultural products are allocated using the top down approach using the total value of agricultural commodities as an indicator. |
| **Intermediate use** | |
| **Marketing costs** | Marketing costs are derived from the *Value of Agricultural Commodities Produced* (cat. no. 7503.0) publication. They are calculated by taking the local value of production for a commodity from the gross value of production for all commodities. Latest year data is forecast using the total value of agricultural commodities as an indicator. |
| **Seed and fodder** | Seed costs are allocated to state from national estimates using the top down approach. The data source is ABARES data for state area of |

| | |
|---|---|
| | agricultural commodities sown. Fodder is split to states using the top down approach using livestock output as the indicator. |
| **Other input costs** | Other input costs such as chemicals, electricity, fuel and maintenance are allocated to state using data from the ABARES Agricultural Commodities publication. |
| **Chain volume** | |
| **Output** | Chain volume estimates for all agricultural commodities above are derived by quantity revaluation. Quantity data is sourced from *Value of Agricultural Commodities Produced* (cat. no. 7503.0). For the latest year, data from Australian Bureau of Agricultural and Resource Economics and Sciences is used.<br><br>Livestock agistment and non-agricultural products are quantity revalued using state aggregate volume commodities above. |
| **Intermediate use** | |
| **Marketing costs** | Volume estimates are derived for all commodity groups by quantity revaluation using actual quantities produced. |
| **Seed and fodder** | Manufactured fodder is re-valued by using relevant components from *Price Indexes of Articles Produced by Manufacturing Industry, Australia* (cat. no. 6412.0). Hay is quantity revalued using data from *Agricultural Commodities Produced* (cat. no. 7503.0). All other components are revalued using farm-specific price deflators produced as a byproduct of compiling corresponding national estimates – the assumption is made that price change for these items is uniform nationally. |
| **Other input costs** | Fertiliser volume estimates in the prices of the previous year are derived by quantity revaluation. For other components, current price estimates are revalued using the relevant component indexes from Index of Prices Received and Paid by Farmers in Agricultural Commodities published by ABARES. |

Table 21.26 Gross value added by industry, current price and volume – Forestry, fishing and agricultural support services

| Item | Comment |
|---|---|
| **Current prices** | |
| **Output** | |
| **Forestry and logging** | Annual state current price estimates are derived by quantity revaluation using current price gross value of production and production quantities for total softwood and hardwood logs as published in *Agricultural Commodities* published by ABARES. |
| **Fishing and aquaculture** | State commodities including prawns, lobster, abalone, scallops, oyster, tuna, other fish are sourced in current price from ABARES data. |
| **Forestry, fishing and agricultural support services** | State output indicators for forestry and fishing commodities above are aggregated to produce a current price output indicator. This is then used to split total forestry, fishing and agricultural support services to states. |
| **Intermediate use** | Intermediate use is split using the top down approach for current prices using the output of forestry, fishing and agricultural support services as the indicator. |
| **Chain volume** | |
| **Output** | |
| **Forestry and logging** | Annual state volume estimates are derived by quantity revaluation using |

| | |
|---|---|
| | current price gross value of production and production quantities for total softwood and hardwood logs as published in Agricultural Commodities published by ABARES. |
| **Fishing and aquaculture** | State commodities including prawns, lobster, abalone, scallops, oyster, tuna, other fish are sourced in volume terms from ABARES data. These are then quantity revalued to produce chain volume estimates. This is assumed to also include aquaculture estimates as part of commodity data. |
| **Forestry, fishing and agricultural support services** | State output indicators for forestry and fishing commodities above are aggregated to produce a volume output indicator. This is then used to split total forestry, fishing and agricultural support services to states. |
| **Intermediate use** | Intermediate use is produced by deflating current price estimates using farm-specific price deflators produced as a byproduct of compiling corresponding national estimates – the assumption is made that price change for these items is uniform nationally. |

Table 21.27 Gross value added by industry, volume – Mining

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Mining** | Mining GOS/GMI (see table 21.3) *plus*<br>Mining COE (see paragraph 21.52) *plus*<br>Mining Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Mining** | Mining output volumes are derived by the quantity revaluation method. The mining products included are:<br>• iron ores;<br>• coal;<br>• bauxite;<br>• copper ores;<br>• gold ores;<br>• nickel ores;<br>• oil, gas, LNG, other petroleum;<br>• lead, silver and zinc ores; and<br>• other metal ores and mineral sands (including tin, uranium, manganese, etc.)<br><br>These products are weighted together using current price values to produce a total mining commodities volume index for each state.<br><br>State production values and quantities of each mineral is sourced from the ABS publication *Australian Industry* (cat. no. 8155.0). This data is based on State Mines Department data on commodity production. Latest year data for commodities are based on data from the Bureau of Resource and Energy (BREE). |
| **Exploration and other mining support services** | Exploration and other mining support services is derived by splitting the national total value added estimates using state quarterly *Business Indicators, Australia (cat. no. 5676.0)*(QBIS), turnover data for exploration and other mining support services. The estimates are then price deflated using a combination of indexes from *Producer Price Indexes, Australia* (cat. no. 6427.0) as well as the wage price index for the mining industry, obtained from the *Wage Price Index, Australia* (cat. no. 6345.0). |
| **Total** | The value added estimates for each state, by each mineral group plus |

| | |
|---|---|
| | Services to mining, are aggregated to Mining division level chain volume output indicator. These are then benchmarked to national estimates to produce state Mining GVA. |

Table 21.28 Gross value added by industry, volume – Manufacturing

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Manufacturing** | Manufacturing GOS/GMI (see table 21.3) *plus*<br>Manufacturing COE (see paragraph 21.52) *plus*<br>Manufacturing Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Manufacturing uses an output indicator approach to compile state by industry GVA estimates. Manufacturing output volumes are derived by deflating sub-division ANZSIC components of manufacturing activities. The output volumes then form the basis upon which volume measures of value added are derived at the division level.<br><br>The current price state estimates of Manufacturing output are obtained from the *Quarterly Business Indicators, Australia (cat. no. 5676.0)* (QBIS). QBIS division totals are then split to sub-division using data from *Australian Industry* (cat. no. 8155.0). This is produced with a one year lag and hence sub-division weights for the current year are kept the same as the previous year.<br><br>The current price output estimates are price deflated using Manufacturing sub-division price indexes, obtained from *Producer Price Indexes, Australia (cat. no. 6427.0)*. These national level price indexes are used as no state level indexes are available. This method is used for each Manufacturing sub-division except for 'Petroleum, coal, chemical and associated product manufacturing' which is quantity revalued using quantities of automotive gasoline, aviation turbine and automotive diesel obtained from the Department of Industry, Tourism and Resource (DITR) publication *Australian Petroleum Statistics*. The volume estimates of output by Manufacturing sub-division for each state are then aggregated to the Manufacturing division level.<br><br>The state output indicators are then used to derive chain volume measures of GVA for Manufacturing. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.29 Gross value added by industry, volume – Electricity, gas, water and waste services

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Electricity, gas, water and waste services** | Electricity, gas, water and waste services GOS/GMI (see table 21.3) *plus*<br>Electricity, gas, water and waste services COE (see paragraph 21.52) *plus*<br>Electricity, gas, water and waste services Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Electricity, gas, water and waste services uses an output indicator approach to compile state by industry GVA estimates. Output volumes are derived using quantity revaluation of the state output indicators. These are compiled according to ANZSIC06 subdivision: |

- electricity;
- gas supply;
- water supply, sewerage and drainage services; and
- waste services.

**Electricity**

Electricity volumes (expressed in megawatt hours, or MWH) produced in New South Wales, Victoria, Queensland, Tasmania and South Australia are obtained from the Australian Energy Market Operator, whereas electricity produced in Western Australia is obtained from the Independent Market Operator of Western Australia. The Northern Territory and the Australian Capital Territory are modelled using household consumption data adjusted for business use and imports from other states.

Electricity price data by state is sourced from the National Electricity Market Management Company (NEMMCO) and reflects the reported 'average annual spot price'. As this data is not available for Western Australia and the Northern Territory, the average of the prices for all other states has been used. For the Australian Capital Territory, the price for electricity from the Snowy Hydro-Electric Scheme is used.

Current price values are then produced by combining prices and volumes.

**Gas**

The quantity of gas produced by state is sourced from the Bureau of Resources and Energy (BREE). Gas price data is sourced from *Consumer Price Index, Australia* (cat. no. 6401.0). Current price values are then produced by combining prices and volumes.

**Water and sewerage**

Water and sewerage current price data and volumes are sourced from various water authorities in New South Wales, Victoria, Queensland and South Australia. For the remaining states, average water consumption per head of population is used. Quantity revaluation is then applied to derive volumes.

**Waste services**

Waste services are sourced from GFS expenditure data. These are price revalued using relevant data from the *Consumer Price Index, Australia (CPI)* (cat. no. 6401.0).

**Total**

The component level output estimates are aggregated and then chained to form total Electricity, gas, water and waste chain volume output indicators by state. The state output indicators are used to derive chain volume measures of GVA for Electricity, gas and water. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA.

Table 21.30 Gross value added by industry, volume – Construction

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Construction** | Construction GOS/GMI (see table 21.3) *plus*<br>Construction COE (see paragraph 21.52) *plus*<br>Construction Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Construction uses an output indicator approach to compile state by industry GVA estimates. Construction output volumes are derived by the price deflation method. Construction GVA indicators are compiled for three categories:<br>• residential building;<br>• non-residential building; and |

- heavy and civil engineering construction.

These are broken down further between public, private and ANZSIC class level to allow price indexes to be applied at more appropriate levels.

The current price estimates are sourced from ABS collections, *Building Activity, Australia* (cat. no. 8752.0), and *Engineering Construction Activity, Australia* (cat. no. 8762.0). The state deflators for residential house construction and alterations and additions to dwellings are sourced from *House Price Indexes, Eight Capital Cities* (cat. no. 6416.0), specifically the state project home price index. Other dwelling price index and non-dwelling building price indexes are sourced from *Producer Price Indexes, Australia* (cat. no. 6427.0).

Current price and deflator data are used to derive state output volume estimates. The output volumes are weighted together using interpolated value added/turnover data from the 1988-89 and 2002-03 editions of *Private Sector Construction Industry, Australia* (cat. no. 8772.0). The resulting survey based value added estimates are then aggregated to division level to derive output volume estimates.

The state output indicators are used to derive chain volume measures of GVA for Construction. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA.

Table 21.31 Gross value added by industry, volume – Wholesale trade

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Wholesale trade** | Wholesale trade GOS/GMI (see table 21.3) *plus*<br>Wholesale trade COE (see paragraph 21.52) *plus*<br>Wholesale trade Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Wholesale trade uses an output indicator approach to compile state by industry GVA estimates. Output volumes are derived by deflating total wholesale trade output by state at a division level. The output volumes then form the basis on which volume measures of value added are derived at the division level.<br><br>The current price estimates of wholesale trade output are obtained from the *Quarterly Business Indicators, Australia (QBIS)* (cat. no. 5676.0). Since QBIS data is only available from 2000/01, Retail sales output (turnover) from *Retail Trade, Australia* (cat. no. 8501.0) has been used as a proxy to compile historical output estimates. Quarterly state output estimates are aggregated to derive annual output estimates.<br><br>The current price output estimates are price deflated using the national wholesale trade deflator from 2000-01. Prior to that, the retail trade deflator by state is used. Both deflators are from *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0).<br><br>The state output indicators are used to derive chain volume measures of GVA for Wholesale trade. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.32 Gross value added by industry, volume – Retail trade

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Retail trade** | Retail trade GOS/GMI (see table 21.3) *plus*<br>Retail trade (see paragraph 21.52) *plus*<br>Retail trade Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Retail trade uses an output indicator approach to compile state by industry GVA estimates. Output volumes are derived by deflating total retail trade output by state at a division level. The output volumes then form the basis on which volume measures of value added are derived at the division level.<br><br>Current price turnover data is sourced from *Retail Trade, Australia* (cat. no. 8501.0), VFACTS and HFCE data. Price information is sourced from the *Consumer Price Index, Australia (CPI*) (cat. no. 6401.0) and used to deflate the current price turnover data to derive a set of turnover volume measures at the ANZSIC class level.<br><br>The state output indicators are used to derive chain volume measures of GVA for Retail trade. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.33 Gross value added by industry, volume – Accommodation and food services

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Accommodation and food services** | Accommodation and food services GOS/GMI (see table 21.3) *plus*<br>Accommodation and food services COE (see paragraph 21.52) *plus*<br>Accommodation and food services Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Accommodation and food services uses an output indicator approach to compile state by industry GVA estimates. Accommodation and food services is compiled as two separate parts:<br><br>• accommodation; and<br>• food and beverage services. |
| **Accommodation** | Accommodation output volumes are derived using quantity revaluation. Accommodation quantity data (guest nights) are sourced from Tourism Research Australia - Department of Resources, Energy and Tourism (National Visitor Survey and International Visitor Survey). The current price estimates of turnover are estimated by applying movements in the accommodation price index (CPI) to the quantity data. |
| **Food and beverage services** | Food and beverage current price estimates are sourced from *Retail Trade, Australia* (cat. no. 8501.0). Price deflators are sourced from *Consumer Price Index, Australia* (cat. no. 6401.0) by capital city. |
| **Total** | The state output indicators are used to derive chain volume measures of GVA for Accommodation and food services. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.34 Gross value added by industry, volume – Transport, postal and warehousing services

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Transport, postal and warehousing** | Transport, postal and warehousing services GOS/GMI (see table 21.3) *plus*<br>Transport, postal and warehousing COE (see paragraph 21.52) *plus*<br>Transport, postal and warehousing Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Transport, postal and warehousing services uses an output indicator approach to compile state by industry GVA estimates. Output volumes are derived by either price deflation or quantity revaluation. These output volumes then form the basis on which volume measures of value added are derived at the division level.<br><br>The current price estimates of group level output are obtained from *Quarterly Business Indicators, Australia* (cat. no. 5676.0), *Australian industry* (cat. no. 8155.0) and HFCE. As QBIS only holds data from 2000-01, for the years prior to this, the total hours worked by state for each group, from the *Labour Force, Australia, Detailed, Quarterly (*cat. no. 6291.0.55.003) was used to compile historical output estimates.<br><br>For current price, QBIS turnover estimates for total industry are split to private road transport, water transport, rail transport, air and space transport and warehousing and storage services using weights from the Economic Activity Survey.<br><br>For road freight, the quantity used is 'tonne/kilometres' from the *Survey of Motor Vehicle Use, Data Cubes, Australia* (cat. no. 9210.0.55.001). Water transport uses 'kilotonnes loaded and unloaded' as its quantity measure from the Bureau of Transport and Regional Economics (BTRE) publication *Australian Sea Freight*. Air transport uses 'passenger numbers' at major airports from the BTRE's *Airport Traffic* publication.<br><br>Components of *Consumer Price Index, Australia (CPI)* (cat. no. 6401.0) by capital city are used to price deflate the HFCE estimates for road passenger transport (compiled using data from local bus and tramway authorities plus modelled data using CPI for taxis) and public rail passenger transport (compiled using data from local rail authorities). Estimates for private rail, warehousing and storage services are price deflated using national level price indexes from *Producer Price Indexes, Australia (PPI)* (cat. no. 6427.0) as no separate state level indexes are available.<br><br>State revenue data is available from Australia Post (2000-01 onwards) and from QBIS for private postal (2001-02 onwards). Australia Post revenue has been extrapolated back to 1989-90 based on state population estimates. State private postal and courier revenue has been extrapolated back based on national private postal and courier revenue.<br><br>Private postal and courier turnover from QBIS and Australia Post current price state turnover which are both deflated using ABS CPI postal services data in 8 capital cities.<br><br>The state output indicators are used to derive chain volume measures at the sub-division level and these are aggregated and then used to derive GVA for Transport, postal and warehousing. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.35 Gross value added by industry, volume – Information media and telecommunications services

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Information media and telecommunications services** | Information media and telecommunications services GOS/GMI (see table 21.3) *plus*<br>Information media and telecommunications services COE (see paragraph 21.52) *plus*<br>Information media and telecommunications services Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Information media and telecommunications services uses an output indicator approach to compile state by industry GVA estimates.<br><br>Private sector turnover volume measures are estimated using revenue data from *Quarterly Business Indicators, Australia (QBIS)* (cat. no. 5676.0). As QBIS only has data from 2000-01, for the years prior to this, the total hours worked by state for each group, from the *Labour Force, Australia, Detailed, Quarterly* (cat. no. 6291.0.55.003) was used to compile historical output estimates.<br><br>Public sector estimates are sourced from GFS data for public broadcasting as well as Telstra prior to privatisation in December 2006.<br><br>QBIS and Telstra data are combined and deflated using a mix of price indexes from *Consumer Price Index, Australia, (CPI)* (cat. no. 6401.0) and *Producer Price Indexes, Australia* (cat. no. 6427.0). Public broadcasting is deflated using the Wage *Price Index, Australia* (cat. no. 6345.0).<br><br>These state turnover volume measures are then aggregated and used to produce chain volume measures of GVA for state Information media and telecommunications services. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.36 Gross value added by industry, volume – Finance and insurance services

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Finance and insurance services** | Finance and insurance services GOS/GMI (see table 21.3) *plus*<br>Finance and insurance services COE (see paragraph 21.52) *plus*<br>Finance and insurance services Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Finance and insurance services uses an output indicator approach to compile state by industry GVA estimates. Output volumes are derived using quantity revaluation of the state output indicators for finance and insurance. The output volumes then form the basis on which volume measures of value added are derived at the division level.<br><br>Component national current price and chain volume data are collected at the industry group level, which are split to state using hours worked, by state, by industry group from the *Labour Force, Australia, Detailed, Quarterly* (cat. no. 6291.0.55.003). Both current price and chain volume measure output values are split by state and by industry group. Industry group data are then aggregated by state and chained to compile the state chain volume output.<br><br>These state output indicators are used to derive chain volume measures of GVA for Finance and insurance services. The state chain volume GVAs |

| | |
|---|---|
| | are then benchmarked to the annual national industry chain volume GVA. |

Table 21.37 Gross value added by industry, volume – Rental, hiring and real estate services

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Rental, hiring and real estate** | Rental, hiring and real estate services GOS/GMI (see table 21.3) *plus*<br>Rental, hiring and real estate COE (see paragraph 21.52) *plus*<br>Rental, hiring and real estate Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Rental, hiring and real estate services uses an output indicator approach to compile state by industry GVA estimates. Output volumes are derived by deflating total rental, hiring and real estate services output by state at division level. The output volumes then form the basis on which volume measures of value added are derived at the division level.<br><br>The current price estimates of rental, hiring and real estate services output are obtained from the *Quarterly Business Indicators, Australia (QBIS)* (cat. no. 5676.0). As QBIS data is only available from 2000-01, *Labour Force, Australia, Detailed, Quarterly* (cat. no. 6291.0.55.003), has been used to backcast the estimates.<br><br>The current price output estimates are priced deflated using the national rental, hiring and real estate services deflator which is based on *Producer Price Indexes, Australia* (cat. no. 6427.0).<br><br>The state output indicators are used to derive chain volume measures of GVA for Rental, hiring and real estate. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.38 Gross value added by industry, volume – Professional, scientific and technical services

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Professional, scientific and technical services** | Professional, scientific and technical services GOS/GMI (see table 21.3) *plus*<br>Professional, scientific and technical services COE (see paragraph 21.52) *plus*<br>Professional, scientific and technical services Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Professional, scientific and technical services uses an output indicator approach to compile state by industry GVA estimates. Output volumes are derived by deflating total professional, scientific and technical services output by state at a division level. The output volumes then form the basis on which volume measures of value added are derived at the division level.<br><br>The current price estimates of professional, scientific and technical services output are obtained from the *Quarterly Business Indicators, Australia (QBIS*) (cat. no. 5676.0). As QBIS data is only available from 2000-01, *Labour Force, Australia, Detailed, Quarterly* (cat. no. 6291.0.55.003), has been used to backcast the estimates.<br><br>The current price output estimates are priced deflated using the national |

| | |
|---|---|
| | professional, scientific and technical services deflator which is based on *Producer Price Indexes, Australia* (cat. no. 6427.0).<br><br>The state output indicators are used to derive chain volume measures of GVA for Professional, scientific and technical services. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.39 Gross value added by industry, volume – Administrative and support services

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Administrative and support services** | Administrative and support services GOS/GMI (see table 21.3) *plus* Administrative and support services COE (see paragraph 21.52) *plus* Administrative and support services Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Administrative and support services uses an output indicator approach to compile state by industry GVA estimates. Output volumes are derived by deflating total administrative and support services output by state at a division level. The output volumes then form the basis on which volume measures of value added are derived at the division level.<br><br>The current price estimates of Administrative and Support Services output are obtained from the *Quarterly Business Indicators, Australia (QBIS)* (cat. no. 5676.0). As QBIS data is only available from 2000-01, *Labour Force, Australia, Detailed, Quarterly* (cat. no. 6291.0.55.003), have been used to backcast the estimates.<br><br>The current price output estimates are priced deflated using the national administrative and support services deflator which is based on *Producer Price Indexes, Australia* (cat. no. 6427.0).<br><br>The state output indicators are used to derive chain volume measures of GVA for Administrative and support services. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.40 Gross value added by industry, volume – Public administration and safety

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Public administration and safety** | Public administration and safety GOS/GMI (see table 21.3) *plus* Public administration and safety COE (see paragraph 21.52) *plus* Public administration and safety Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Public administration and safety uses an output indicator approach to compile state by industry GVA estimates. Output volumes are derived using quantity revaluation of the state output indicators for both public administration and safety and defence.<br><br>Current price government expenditure data is sourced for public administration and safety as well as defence components from GFS estimates.<br><br>Hours worked of public administration and safety employees is sourced |

| | |
|---|---|
| | from *Wage and Salary Earners, Public Sector, Australia* (cat. no. 6248.0.55.001). Defence Force employee numbers are sourced from the Department of Defence annual report. These are used to quantity revalue equivalent current price measures.<br><br>These state output indicators are used to derive chain volume measures of Public administration and safety. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.41 Gross value added by industry, volume – Education and training

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Education and training** | Education and training GOS/GMI (see table 21.3) *plus*<br>Education and training COE (see paragraph 21.52) *plus*<br>Education and training Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Education and training uses an output indicator approach to compile state by industry GVA estimates. The quantity revaluation method is used to derive state specific education output indicators at the division level.<br><br>Public sector current price data are sourced from the *Government Finance Statistics, Australia*, (cat. no. 5512.0) and private sector current price data are sourced from the Department of Education, Science and Training (DEST).<br><br>Number of students of pre-schools, primary and secondary schools are obtained from *Schools, Australia* (cat. no. 4221.0), university data from the DEST annual reports and Vocational Education and Training from the National Centre for Vocational Education Research (NCVER) annual statistics. These are used to quantity revalue equivalent current price measures.<br><br>All student numbers are lagged by one year with an autoregressive integrated moving average (ARIMA) model being used to estimate student numbers for the latest year.<br><br>These state output indicators are used to derive chain volume measures of GVA for Education and training. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.42 Gross value added by industry, volume – Health care and social assistance

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Health care and social assistance** | Health care and social assistance GOS/GMI (see table 21.3) *plus*<br>Health care and social assistance COE (see paragraph 21.52) *plus*<br>Health care and social assistance Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | The current price output estimates include eight components:<br><br>• public hospitals;<br>• private hospitals;<br>• public psychiatric hospitals; |

- private psychiatric hospitals;
- nursing homes;
- public health insurance;
- private health insurance; and
- child care services.

Output volumes are derived using quantity revaluation of the state output for health care and social assistance for the first seven components listed above and the price deflation method for the last component. As latest year output data is not available for all components, only the three available components are used to extrapolate the total state current price output. These three components are nursing homes, private health insurance and public health insurance.

Public hospitals, private hospitals and public psychiatric hospitals data are sourced from the Australian Institute of Health and Welfare. Private psychiatric hospitals data are sourced from *Private Hospitals, Australia* (cat. no. 4390.0). Public health insurance data are sourced from Medicare. Private health insurance data are sourced from the Private Health Insurance Administration Council. Nursing homes data are sourced from the Department of Health and Ageing. Child care expenditure data is sourced from the Department of Education, Employment and Workplace Relations. This is price deflated using *Consumer Price Index, Australia (CPI)* (cat. no. 6401.0) for child care services.

The state output indicators are used to derive chain volume measures of GVA for Health care and social assistance. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA.

Table 21.43 Gross value added by industry, volume – Arts and recreation services

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Arts and recreation services** | Arts and recreation services GOS/GMI (see table 21.3) *plus*<br>Arts and recreation services COE (see paragraph 21.52) *plus*<br>Arts and recreation services Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Arts and recreation services uses an output indicator approach to compile state by industry GVA estimates. This is broken up into private and public sectors, both of which are price deflated. Private sector uses HFCE components of gambling, sport and recreation services, and cultural entertainment services. These are price deflated using the Consumer Price Index.<br><br>Public sector current price data is soured from GFS data for public expenditure on arts and recreation. This is for state and local as well as Commonwealth. Commonwealth expenditure is split to states using population data. State and Commonwealth components are deflated with aggregate price deflators for total state and Commonwealth consumption produced for *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0).<br><br>The state output indicators are used to derive chain volume measures of GVA for Arts and recreation services. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.44 Gross value added by industry, volume – Other services

| Item | Comment |
|---|---|
| **Current price estimates** | |
| **Other services** | Other services GOS/GMI (see table 21.3) *plus*<br>Other services COE (see paragraph 21.52) *plus*<br>Other services Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Other services uses an output indicator approach to compile state by industry GVA estimates. Output volumes are derived by deflating total other services output by state at a division level. The output volumes then form the basis upon which volume measures of value added are derived at the division level.<br><br>The current price estimates of Other Services output are obtained from the quarterly ABS *Business Indicators, Australia* (QBIS) (cat. no. 5676.0). Since QBIS data is only available from 2000-01, *Labour Force, Australia, Detailed, Quarterly* (cat. no. 6291.0.55.003), have been used to backcast the estimates.<br><br>The current price output estimates are priced deflated using the national Administrative and Support Services deflator which is based on ABS collection, *Producer Price Indexes, Australia* (cat. no. 6427.0).<br><br>The state output indicators are used to derive chain volume measures of GVA for Other services. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.45 Gross value added by industry, volume – Ownership of dwellings

| Item | Comment |
|---|---|
| **Current price estimates** | |
| Ownership of dwellings | Ownership of dwellings GOS (see table 21.5) *plus*<br>Ownership of dwellings Other taxes less subsidies on production (see table 21.23) |
| **Volume estimates** | |
| **Method** | Ownership of dwellings uses an output indicator approach to compile state by industry GVA estimates.<br><br>Output volumes and current prices are directly sourced from state HFCE for owner occupied and actual rent. These are used to produce state output indicators.<br><br>State output indicators are used to derive chain volume measures of GVA for ownership of dwellings. The state chain volume GVAs are then benchmarked to the annual national industry chain volume GVA. |

Table 21.46 Taxes less subsidies on products

| Item | Comment |
|---|---|
| **Current price estimates** | |
| | Current price compilation of taxes less subsidies is described in table 21.24. |
| **Volume estimates** | |
| **Method** | Taxes less subsidies on products uses the top down approach to compile state volume estimates. This occurs by deflating components of Commonwealth and State and local taxes and subsidies on products.<br><br>Volume estimates of Commonwealth taxes on products are produced using quantity revaluation. The indicators used for quantity revaluation depend on each individual tax and are outlined in Table 21.7.<br><br>Subsidies are price revalued with the Australia level subsidies deflator across states for both Commonwealth and State and local estimates. The Australia level deflator is created by quantity revaluing components similar to Commonwealth taxes above.<br><br>State and local taxes are similarly price deflated using the national price deflator for state and local taxes. Both deflation methods make the assumption that price movements are the same across states.<br><br>Taxes and subsidies on products are then aggregated across components of State and local and Commonwealth components. Total taxes less subsidies on products state indicators are then benchmarked to Australia level to produce a CVM estimate. |

HOUSEHOLD INCOME ACCOUNT

21.174 State household income accounts are estimated using the top down approach. A range of indicators are used to allocate Australia totals to state.

21.175 In concept, the household sector of a state consists of household units which have permanent residence within the state. This is independent of where household units work or undertake business activities. It follows that workers who work in a state other than their state of residence should be reallocated to their place of residence rather than their place of work. Data sources do not permit this reallocation. Therefore, an assumption is made that all workers work in their state of residence.

21.176 At state level household net saving is not produced because of the unavailability of state consumption of fixed capital for households. Consequently, gross (rather than net as in the national accounts) household saving is calculated.

21.177 The following table outlines the components of the household income and data sources used to allocate the national total across the states:

Table 21.47 Household income account – by components

| Item | Comment |
|---|---|
| **Primary income receivable** | |
| **Compensation of employees** | State household COE estimates are split using the top down approach using state estimates of COE from the gross state product account. The Australia level household COE is COE adjusted for labour income to and from overseas. There is no adjustment for interstate workers with assumption being that employees work in their state of residence. |
| **Gross mixed income** | Estimates of GMI by state are compiled from agriculture and non-agriculture components.<br><br>State estimates of agricultural unincorporated enterprises are split using the top down approach using agricultural production by state. The assumption is made that the high concentration of unincorporated enterprises in agriculture observed at the national level is consistent across all states.<br><br>GMI of non-agricultural unincorporated enterprises is split to state using the proportions of business income of unincorporated enterprises (i.e. individuals, partnerships and trusts) from Taxation Statistics as well as business income from *Household Income and Income Distribution, Australia* (cat. no. 6523.0). |
| **Dwelling owned by household - Gross operating surplus** | State estimates are split using the top down approach using GOS dwellings by state produced for the production account. The Australia level dwelling owned by household GOS is total dwellings GOS adjusted for dwellings owned by other sectors of the economy. The assumption is made that ownership of dwellings for sectors other than households occurs in the same proportion in all states. |
| **Property income** | Property income is sourced from state interest and dividends data from the ATO taxation statistics publications. |
| **Secondary income receivable** | |
| **Social assistance benefits** | Social assistance benefits include benefits received from government, and is sourced from Government Finance Statistics. Commonwealth data is allocated to states using *Household Income and Income Distribution, Australia* (cat. no. 6523.0) for total government pensions and allowances. |
| **Workers' compensation claims** | State estimates are split using the top down approach using state workers' compensation premiums data used to compile state COE |

estimates. This assumes that claims are paid in the same proportion as premiums across states.

**Non-life insurance claims**

State estimates are split using the top down approach using estimated resident population. Some adjustment is undertaken for large natural events such as cyclones and floods.

**Current transfers to non-profit institutions (NPIs)**

Consistent with the national accounts, at state level the NPISH sector is included as part of the household sector and the data is sourced from the *Government Finance Statistics.* Commonwealth *Government Finance Statistics is allocated to states using* estimated resident population (ERP) from *Australian Demographic Statistics* (cat. no. 3101.0).

**Other transfers receivable**

This is split between transfers made by immigrants to Australia and remaining miscellaneous transfers.

Immigrant transfers are split using the top down approach to states using state overseas arrivals data from *Australian Demographic Statistics* (cat. no. 3101.0). Remaining transfers receivable are split using the top down approach using ERP data.

***Total gross income***

*Total gross income = primary income receivable + secondary income receivable.*

**Primary income payable**

**Dwellings interest payable**

Dwellings interest is split using the top down approach to states using a cumulative aggregation of new loan commitments over a 15 year period from *Housing Finance, Australia* (cat. no. 5609.0). A cumulative aggregation is compiled due to the long life span of dwelling loans.

**Consumer debt interest payable**

State consumer debt interest is split using the top down approach using fixed loans and revolving credit data directly from *Lending Finance, Australia* (cat. no. 5671.0).

**Unincorporated enterprises payable**

State unincorporated interest payable is split using the top down approach using business interest paid components from ATO taxation statistics.

**Secondary income payable**

**Income tax payable**

Income tax payable is split to states using the top down approach using income tax by state data from ATO taxation statistics. This is received with a two year lag. A combination of state COE and state GMI estimates are used to estimate state splits for the latest two years.

**Other current taxes on income, wealth, etc.**

Other current taxes on income, wealth, etc. are split to states using the top down approach using income tax by state data from ATO taxation statistics and GFS data.

**Workers' compensation premiums**

State estimates are split using the top down approach using state premiums data used to compile state COE estimates.

**Net non-life insurance premium payments**

State estimates are split using the top down approach using ERP estimates. Some adjustment is undertaken for large natural events such as cyclones and floods.

**Other current transfers payable**

This comprises transfers to migrants leaving Australia as well as current transfers to other sectors i.e. miscellaneous current transfers such as fines and pensions paid to non-residents.

Migrant transfers are split using departures data from *Australian Demographic Statistics* (cat. no. 3101.0).

Miscellaneous current transfers are allocated to states using ERP estimates.

| | |
|---|---|
| ***Total income payable*** | *Total income payable = primary income payable + secondary income payable.* |
| ***Gross disposable income*** | *Gross disposable income = total income receivable – total income payable.* |
| **Household gross saving** | Household gross saving = gross disposable income – household final consumption expenditure<br><br>This is equivalent to net saving plus consumption of fixed capital as published in the national accounts, since consumption of fixed capital is not separately allocated by state. |

AGRICULTURAL INCOME ACCOUNT

21.178 The agricultural income account details the primary income flows for the agriculture industry (i.e. subdivision 01 Agriculture in ANZSIC 06) of the economy. It combines estimates for agricultural GVA, GOS/GMI and COE with other expenses to produce agricultural income.

21.179 The key aggregates of agricultural income are:

- agriculture GVA at basic prices;
- agriculture GVA at producer prices; and
- agricultural income.

21.180 Agricultural income is calculated as follows:

Agricultural income = agricultural GOS/GMI
– property income payable
– consumption of fixed capital

where agricultural GOS/GMI is calculated as:

Agricultural GOS/GMI = agricultural gross value added
– agricultural compensation of employees
– agricultural other taxes on production
+ agricultural other subsidies on production

21.181 The following calculation shows how gross value added for both basic prices and producer prices is derived from agricultural income:

Gross value of agricultural production

*less* Intermediate input costs
*equals* Gross agricultural value added at basic prices

*plus* Taxes less subsidies on products
*equals* Gross agricultural value added at producers' prices

21.182 The following table outlines the components of the agricultural income account and data sources used to allocate the national total across the states:

Table 21.48 Agricultural income account – by components

| Item | Comment |
|---|---|
| **Agricultural output** | Agricultural output data is collected from the Australian Bureau of Agricultural and Resource Economics (ABARE) and *Value of Agricultural Commodities Produced* (VACP) (cat. no. 7503.0). (See Table 21.25 for more details.) |
| **Agricultural input costs** | Agricultural input costs are calculated as the sum of marketing costs, fodder costs, seed costs and other costs. (See Table 21.25 for more details.) |
| ***Agricultural gross value added at basic prices*** | *Agricultural gross value added at basic prices = Agricultural output – Agricultural input costs.* |
| **Agricultural compensation of employees (COE)** | The national ratio of the ANZSIC subdivision agriculture COE to the ANZSIC division agriculture, forestry and fishing COE is applied to all states. The assumption is made that the same proportions apply across all states. |
| **Consumption of fixed capital (COFC)** | National benchmarks are allocated to states using fixed weights based on the ABS Agricultural Finance Survey (AFS) which ceased in 2001. |
| **Net property income payable** | National benchmarks are allocated to states using fixed weights based on the ABS Agricultural Finance Survey (AFS) which ceased in 2001. |
| ***Agricultural expenses*** | *Agricultural expenses = Agricultural COE + COFC + Net property income payable* |
| **Other taxes less subsidies on production** | The national ratio of the ANZSIC subdivision agriculture other taxes less subsidies on production to the ANZSIC division agriculture, forestry and fishing other taxes less subsidies on production is applied to all states. This assumes the same proportion exists for all states. |
| ***Agricultural income*** | *Agricultural income = Agricultural gross value added – Other taxes less subsidies on production – Agricultural expenses* |
| **Taxes less subsidies on products** | The national benchmark is allocated to states using the proportions of state agricultural output. |
| ***Agricultural gross value added (GVA) at producers' prices*** | *Agricultural GVA at producers' prices =GVA at basic prices + Taxes less subsidies on products* |

# CHAPTER 22 INPUT-OUTPUT TABLES

## INTRODUCTION

22.1 The Input-Output (I-O) tables form an integral part of the ASNA. They present a comprehensive picture of the supply and use of all products in the economy, and the incomes generated from production. They also provide a much more detailed disaggregation of gross domestic product than is available in the national income, expenditure and production (GDP) accounts. This chapter provides a detailed description of the I-O tables, their importance within the overall ASNA, the compilation process and how they relate to the rest of the accounts. In national accounting and economic analysis two kinds of I-O tables are referred to:

- Supply and Use (S-U) tables (see Chapter 7 for a full description of how S-U tables are used to benchmark the ASNA);
- I-O tables, including symmetric I-O tables (product by product or industry by industry matrices which combine supply and use into the one table, with identical classifications of products or industries applied to both rows and columns).

22.2 The integration of 'input-output' in the overall system of national accounts is an important feature of the ASNA. Its role in the ASNA is primarily related to the goods and services accounts and to the shortened sequence of accounts for industries. The I-O tables serve to provide a more detailed basis for analysing industries and products through a breakdown of the production account, leading to the symmetric input-output table. 'Symmetric' means that the same classifications or units (e.g. the same groups of products) are used in both rows and columns. When the number of rows of products and columns of industries happens to be equal, they are referred to as square (not symmetric) I-O tables. However, I-O tables are most often rectangular (having more products than industries).

22.3 The I-O and S-U tables serve two purposes: statistical and analytical. They provide a framework for checking the consistency of statistics on flows of goods and services obtained from quite different kinds of statistical sources - industrial surveys, household expenditure inquiries, investment surveys, foreign trade statistics, etc. The ASNA, and the input-output tables in particular, serves as a coordinating framework for economic statistics, both conceptually for ensuring the consistency of the definitions and classifications used and as an accounting framework for ensuring the numerical consistency of data drawn from different sources. The I-O framework is also appropriate for data estimation purposes, and for detecting weaknesses in data quality and estimation. By providing information on the structure of, and the nature of product flows through the economy, the I-O tables assist in the decomposition of transactions into prices and volumes for the calculation of an integrated set of price and volume measures. As an analytical tool, input-output data are conveniently integrated into macroeconomic models in order to analyse the link between final demand and industrial output levels. Input-output analysis also serves a number of other analytical purposes or uses, which are discussed further in the sections below.

22.4 I-O tables are not revised once they have been finalised. They are not compiled as a time series but rather are a point in time reflection of the economy. However the rest of the national accounts (e.g. the S-U tables and the GDP accounts) may be revised for all periods whenever an historical revision is undertaken, and therefore are a consistent time series.

22.5 Various tables are included under the broad heading of I-O tables. Each of these tables provides detail that underlies the aggregates recorded in the gross domestic product account. These summary accounts are focused on the end result of economic activity, whereas the I-O tables provide detailed dissections of that activity, industry to industry flows and by showing intermediate transactions they enhance the description of productive activity within the economy.

## THE STRUCTURE OF THE I-O TABLES

22.6 The I-O tables are sourced from the S-U tables, and the concepts and definitions used are the same as elsewhere in the ASNA. Issues of particular importance to the I-O tables include statistical units and the distinction between primary and secondary activities.

22.7 The ABS uses an economic statistics model to describe the characteristics of units, and the structural relationships between businesses. Businesses with a simple structure are classified by their Australian Business Number (ABN) on the Australian Business Register (ABR), maintained by the Australian Taxation Office (ATO). Businesses with a more complex structure (i.e. where the ABN is not suitable for ABS statistical requirements) are maintained on the ABS Maintained Population register (ABSMP), through direct contact with the business. These units comprise the Enterprise Group, the Enterprise and the Type of Activity Unit (TAU). The TAU represents a grouping of one or more business entities for which a basic set of financial production or employment data can be reported.

22.8 When a unit engages in more than one type of production, the primary production is the activity for which gross value added is the greatest for that unit. The production reported by a unit may include both primary and secondary production. The output of an industry may be a number of products that are jointly produced, e.g. natural gas linked to crude oil. In this case primary products may be distinguished by the principal product with the smaller output treated as secondary production.

22.9 I-O tables can be compiled for industries or products but they are both similar in theory. The distinguishing characteristics of analytical I-O tables are that they are square and symmetric, and they differ from the S-U tables in that the transactions are valued at basic prices rather than purchasers' prices. The I-O tables provide detailed information about the supply and use of products in the Australian economy and about the structure and inter-relationship between Australian industries.

22.10 Table 22.1 provides a summary of the different dimensions and values shown in the published I-O tables. Detailed information on the content of each published table is provided below the summary table.

Table 22.1 SUMMARY OF I-O TABLES PUBLISHED BY THE ABS

| Table No. | Type of table | Row | Column | Value |
|---|---|---|---|---|
| 1 - 4 | Basic tables | Product | Industry | Current Price |
| 5 | Derived table | Industry | Industry | Current Price |
| 6 - 7 | Derived tables | Industry | Industry | Coefficient |
| 8 | Derived table | Industry | Industry | Current Price |
| 9 - 10 | Derived tables | Industry | Industry | Coefficient |
| 17 | Derived table | Industry | Primary Input | Percentage |
| 19 | Derived table | Industry | Ratios | Coefficient |
| 20 | Derived table | Industry | Employment | No. of persons |
| 21 | Basic table | Product | Margin/Non margin | Current Price |
| 23 -39 | Basic tables | Product | Industry | Current Price |
| 40 | Correspondence tables | | | |

## Basic tables of I-O

22.11 The basic tables of I-O are aggregations of the various components of GDP. The most significant feature of these tables is that they are not symmetrical in that the dimension of the columns differ from dimension of the rows.

22.12 There are four main basic tables used to compile the I-O tables:

1. Supply table – shows the output of domestic industries and imports in the columns, and outputs of products primary to these industries in the rows. The largest values are found on the main diagonal as industries mainly produce products primary to it. The columns in the supply table show the products each industry produces, and the extent to which industry specialises in the production of its primary products, as well as the product composition of imports.

2. Use table – shows the product groups and primary inputs in the rows, and industries and final use categories in the columns. The rows show the total supply of products, whether locally produced or imported, and show how these products are used by industries as intermediate inputs to production, or consumed as final demand by category. At the bottom of the table, the rows show the primary inputs purchased by industries, and by final demand. reading down the columns shows the you can read the inputs (intermediate and primary) into each industry, and the composition of each final demand category. Therefore all flows of goods and services in the economy are covered.

3. Imports table – shows in the columns the industries to which imported products would have been primary if they had been produced in Australia, and in rows the usage of these products by industry and final demand category. This breakdown is only shown for competing imports, or those products which are produced domestically and imported, so that substitution between domestically produced products and imports is possible. The disposition is not shown for complementary imports, which by definition are products that are not domestically produced. Since the 2001-02 I-O tables, no imports have been identified as complementary.

4. Margins table – shows the difference between the basic price and the purchaser's price of all flows in the use table. Table 4 of *Australian National Accounts: Input-Output Tables – Electronic Publication* (cat.no. 5209.0.55.001) shows the decomposition of flows at purchaser prices into basic prices, net taxes on products and the sum of all trade and transport margins. Tables 23 to 39 show the detailed disposition of each type of margin, product taxes by type, and product subsidies, to intermediate use and final use categories.

22.13 These four main basic tables make up a record of the estimated flows that which occur in the production process. However, the use table is not symmetric which makes it unsuitable for some forms of analysis. This problem is solved by converting the use table to an industry-by-industry flow table by adjusting the rows to show industry use of industry output, rather than products. The ABS does not produce product-by-product flow tables.

22.14 Table 22.2 provides a summary of the basic I-O tables published by the ABS.

Table 22.2 BASIC TABLES PUBLISHED BY THE ABS

| Table No. | Description |
|---|---|
| 1 | Australian Supply Table - Supply by Product Group by Industry<br>• shows Australian production at basic prices |
| 2 | Use Table – Input by Industry and Final Use Category and Supply by Product Group<br>• shows intermediate use by using industries (IOIG) and final use by final use categories of goods and services at basic prices with indirect allocation of imports. |
| 3 | Imports – Supply by Product Group and Inputs by Industry and Final Use category<br>• shows intermediate use by using industries (IOIG) and final use by final use categories of imported goods and services at basic prices. |
| 4 | Reconciliation of Flows at Basic Prices and at Purchasers' Prices by Product Group<br>• shows flows at purchasers' prices reconciled with basic prices;<br>• trade and transport margins, and net taxes on products are added to basic prices to derive |

purchasers' prices for intermediate and all final use categories and for total supply; and
- imports are indirectly allocated in this table.

21 Composition of Supply of Products Containing Margins
- shows the composition of margin and non–margin commodities in the supply of relevant products.

23 Wholesale Margin on Supply by Product Group by Using Industry and Final Use category
- shows the disposition of wholesale margin associated with the supply of domestic and imported products to intermediate usage and final use categories.

24 Retail Margin on Supply by Product Group by Using Industry and Final Use category
- shows the disposition of retail margin associated with the supply of domestic and imported products to intermediate usage and final use categories.

25 Restaurants, Hotels and Clubs Margin on Supply by Product Group by Using Industry and Final Use category
- shows the disposition of restaurants, hotels and clubs margin associated with the supply of domestic and imported products to intermediate usage and final use categories.

26 Road Transport Margin on Supply by Product Group by Using Industry and Final Use category
- shows the disposition of road transport margin associated with the supply of domestic and imported products to intermediate usage and final use categories.

27 Rail Transport Margin on Supply by Product Group by Using Industry and Final Use category
- shows the disposition of rail transport margin associated with the supply of domestic and imported products to intermediate usage and final use categories.

28 Pipeline Transport Margin on Supply by Product Group by Using Industry and Final Use category
- shows the disposition of pipeline transport margin associated with the supply of domestic and imported products to intermediate usage and final use categories.

29 Water Transport Margin on Supply by Product Group by Using Industry and Final Use category
- shows the disposition of water transport margin associated with the supply of domestic and imported products to intermediate usage and final use categories.

30 Air Transport Margin on Supply by Product Group by Using Industry and Final Use category
- shows the disposition of air transport margin associated with the supply of domestic and imported products to intermediate usage and final use categories.

31 Port Handling Margin on Supply by Product Group by Using Industry and Final Use category.
- shows the disposition of port handling margin associated with the supply of domestic and imported products to intermediate usage and final use categories.

32 Marine Insurance Margin on Supply by Product Group by Using Industry and Final Use category
- shows the disposition of marine insurance margin associated with the supply of domestic and imported products to intermediate usage and final use categories.

33 Gas Margin on Supply by Product Group by Using Industry and Final Use category
- shows the disposition of gas margin associated with the supply of domestic and imported products to intermediate usage and final use categories.

In this case the supplied products are entirely in the product group Oil and gas extraction.

34 Electricity Margin on Supply by Product Group by Using Industry and Final Use category.
- shows the disposition of electricity margin associated with the supply of domestic and imported products to intermediate usage and final use categories.

In this case the supplied products are entirely in the product group Electricity generation.

35 Net Taxes on Products by Product Group by Using Industry and Final Use category
- shows the disposition of net taxes, that is taxes less subsidies, associated with the supply of domestic and imported products to intermediate usage and final use categories.

36 Goods and Services Tax on Products by Product Group by Using Industry and Final Use category
- shows the disposition of Goods and Services Tax (GST) associated with the supply of domestic

and imported products to intermediate usage and final use categories.

37 Duty on Products by Product Group by Using Industry and Final Use category
- shows the disposition of duty (excise, imports duty etc.) associated with the supply of domestic and imported products to intermediate usage and final use categories.

38 Taxes on Products NEI by Product Group by Using Industry and Final Use category
- shows the disposition of taxes not elsewhere identified associated with the supply of domestic and imported products to intermediate usage and final use categories.

39 Subsidies on Products by Product Group by Using Industry and Final Use category
- shows the disposition of subsidies associated with the supply of domestic and imported products to intermediate usage and final use categories.

By convention subsidies are shown as negative values in the table.

## Derived tables of I-O

22.15 Derived tables differ from the basic tables in I-O in that they are symmetric so that the dimensions of the columns and rows are the same. The dimension is either product by product or industry by industry. In Australia the derived I-O tables are industry by industry.

22.16 Another feature of the derived table is that they are not simply aggregations of the components. Some further calculations are applied in order to produce the tables namely the derivation of coefficients.

22.17 Table 22.3 depicts the industry-by-industry table. A row in the table shows the disposition of the output of an industry group and a column shows the origin of inputs into an industry and final use category. The output of an industry equals the sum of its inputs including its primary inputs so the column total must equal the row total.

Table 22.3 Industry by industry flow matrix

| | TO | Intermediate demand | | | | | | Final Demand | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | FROM INDUSTRY | 0101 Sheep, Grains, Beef and Dairy Cattle | 0102 Poultry and Other Livestock | 0103 Other Agriculture | 0201 Aquaculture | 0301 Forestry and logging | 0401 Fishing, Hunting and trapping | Total | Final c | Final consumption - Households | Final consumption - Government | Gross Fixed Capital Formation - Private | Gross Fixed Capital Formation - Pub. Ent. | Gross Fixed Capital Formation - Gen Govt. | Change in Inventories | Exports | Final Demand | Final Use |
| Intermediate inputs | 0101 Sheep, Grains, Beef and Dairy Cattle<br>0102 Poultry and Other Livestock<br>0103 Other Agriculture<br>0201 Aquaculture<br>0301 Forestry and logging<br>0401 Fishing, Hunting and trapping | Quadrant 1<br>Intermediate usage | | | | | | | Quadrant 2<br>Final Demand | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| Primary Inputs | P1 Compensation of employees<br>P2 Gross operating surplus and mixed income<br>P3 Taxes less subsidies on products<br>P4 Other taxes less subsidies on production<br>P5 Complementary imports<br>P6 Competing imports | Quadrant 3<br>Primary Inputs to Production | | | | | | | Quadrant 4<br>Primary Inputs to inal Demand | | | | | | | | | |
| | Australian Production | | | | | | | | | | | | | | | | | |

22.18 Table 22.3 shows the basic structure of an industry-by-industry table with direct allocation of imports (as is published in Table 5 of the *Australian National Accounts: Input-Output Tables – Electronic Publication* (cat.no. 5209.0.55.001)) where imports are allocated to the using industries. The flows between the domestic industries are:

- quadrant 1 – this is referred to as the inter-industry quadrant where each column shows the intermediate inputs into an industry in the form of products produced by other industries and itself. Each row shows how the output of an industry has been used by itself and other industries as part of their production process;
- quadrant 2 – shows the disposition of output to final use categories by industry group;
- quadrant 3 – shows the primary inputs to production (compensation of employees, gross operating surplus and gross mixed income, imports and net taxes on production); and
- quadrant 4 – shows the disposition of primary inputs to final demand categories.

22.19 The sum of quadrants 1 and 2 shows the total usage of goods and services produced by each industry. Total usage equals total supply, with final demand including change in inventories, which may be positive or negative.

22.20 The sum of quadrants 1 and 3 shows the total inputs required to produce the outputs of each industry group. Total inputs equals total supply or outputs, with primary inputs including gross operating surplus and gross mixed income, which can conceptually be positive or negative.

22.21 Table 8 of the I-O tables released in the *Australian National Accounts: Input-Output Tables – Electronic Publication* (cat.no. 5209.0.55.001) is an industry-by-industry flow table with indirect allocation of imports. In this table:

- supply by industry group includes Australian produce and similar products which are imported; and
- the inputs into an industry's production reflect the technological relationships between all inputs into the industry, regardless of whether they are domestically produced or imported.

22.22 Analysis using an I-O table with indirect allocation of imports allows for imports substitution by domestic production. In order to balance the table, that is show total supply (row total) for each industry equal to the corresponding total uses (column total), the row for competing imports is shown below the Australian production. For each column this row shows the value of imports competing with the output of each industry. This presentation results in the double entry for imports in the table to reconcile total supply and total uses. In a table with direct allocation of imports, the competing imports row is shown above the Australian production row and shows for each industry the total intermediate use of imports by the industry.

22.23 The difference between the direct and indirect allocation of imports is discussed in the allocation of import section.

22.24 The following table provides a summary of the derived I-O tables published by the ABS.

Table 22.4 DERIVED I-O TABLES PUBLISHED BY THE ABS

| Table No. | Description |
|---|---|
| 5 | Industry by Industry Flow Table (Direct Allocation of Imports)<br>• shows the allocation of Australian produced industry outputs to industries and to all final use categories;<br>• imports are directly allocated - they are allocated to the industries which use them and are included with the primary inputs to these industries in deriving the total production; and<br>• the intermediate and final use contain only the use of the domestic production, so the intermediate use matrix does not reflect the full input structure of industries. |
| 6 | Direct requirements Coefficients (Direct Allocation of Imports)<br>• shows values in a particular column representing the direct input requirements from each industry (Australian production) and from all primary inputs when Australian output of the industry or final use category, represented by the column, increases by $100. |
| 7 | Total requirements Coefficients (Direct Allocation of Imports – also known as the Leontief inverse matrix)<br>• shows values in a particular column representing the total input requirements of Australian production from each industry represented by a row, by the industry represented by that |

column when the Australian output of the industry increases by $100.

8 Industry by Industry Flow Table (Indirect Allocation of Imports)
- shows the allocation of goods and services, inclusive of imports, but excluding re-exports, from industry to industry and to all final use categories; and
- imports are indirectly allocated and are included in the intermediate use of industries and in final use categories without distinguishing the imports from the products with which they compete allowing the intermediate use matrix to fully reflect the input structures of industries.

9 Direct Requirements Coefficients (Indirect Allocation of Imports)
- the values in a particular column represent the direct requirements of supply from the industry represented by the row, when the Australian output of the industry represented by the column increases by $100.

This table is similar to Table 6 however the values in this table include imports whereas values within Table 6 do not.

10 Total Requirements Coefficients (Indirect Allocation of Imports)
- values in a particular column of this table represent the total supply requirements from the industry represented by the row, when the Australian output of the industry represented by the column increases by $100.

This table is similar to Table 7, however, the values in this table include imports whereas in Table 7 they do not.

## Additional published tables

22.25 There are four additional tables that are published which are not basic or derived I-O tables. The following table provides a summary of them:

Table 22.5 ADDITIONAL PUBLISHED TABLES

| Table No. | Description |
|---|---|
| 17 | Primary Input Content (Total requirements) per $100 of Final Use by Industry<br>• shows values in a particular row representing the requirements of compensation of employees, gross operating surplus and mixed income, taxes less subsidies on products, other taxes less subsidies on production and imports by the industry represented by that row, when that industry uses a total of $100 of these primary inputs in the production process. |
| 19 | Specialisation and Coverage Ratios by Industry<br><br>An industry may produce a number of products, some of which may be primary to that industry and some of which may be primary to other industries. The specialisation ratio shows the proportion of an industry's output that is primary to that industry.<br><br>A product may be supplied by more than one industry. The coverage ratio shows what proportion of the total domestic supply of a product is produced by the industry to which the product is primary. |
| 20 | Employment by Industry<br>• shows the number of employees and employed persons in each industry based on data from the Labour Force Survey. |
| 40 | Industry and Product Concordances<br>• IOIG to ANZSIC06;<br>• IOIG (2005) to IOIG (2009);<br>• IOPC (2005) to IOPC (2009);<br>• IOPC to Consumer Price Index (CPI); and<br>• IOPG to Household Expenditure Classification (HEC). |

### Homogeneity assumption

22.26 In quadrant 1, a row or column is said to refer to an industry, however a row or column can refer to a product, or group of products rather than an industry. The structure of products or industries is important in the use of the I-O tables. Ideally it is desirable that each product or industry changes as little as possible over time, and that each industry produces a single output, and has a single input structure. This implies that all products produced by an industry are perfect substitutes for each other, or are produced in fixed proportions, and that the input structure does not vary in response to changes in the product mix, and there is no substitution between the products of different groups of products or industries. This is known as the homogeneity assumption. However, it is not fully supported in the ABS I-O tables due to the units model used allowing for secondary production by industries, as it is based on TAUs rather than establishments.

22.27 The stability of coefficients is affected by the interaction of two factors, the aggregation of products that have different input structures and changes in the product group mix over time. This becomes important when the data sources for the I-O coefficients are infrequent and it is necessary to assume that observed coefficients apply in the following years, at least as a starting point. This problem arises in industries producing a range of products that have different input structures.

22.28 Even in large I-O tables there is significant aggregation which leads to a departure from these objectives and affects the homogeneity of products or industries. There are two ways the aggregation can be made, grouping by industries to create an industry-by-industry table (which the ABS does), or grouping by products to create a product-by-product table. The two methods result in differing impacts on homogeneity with different implications for the analytical use of the tables. There is no complete solution for the aggregation problem but appropriate grouping can keep errors to acceptable limits. The groups used are partly dependent on industry classifications, and the practical process of compiling the I-O tables.

22.29 At first sight, the solution to the grouping problem could be to define narrow product groupings. However, this could result in the tables becoming too complicated for users, and would take too long to compile, particularly as the ABS is now producing I-O tables every year. Even with narrower product groupings there would be instances where a TAU produced products classified to different groups of products and it would not be practical to split details to different groups. Confidentiality would also become a problem in some industries as the products covered in a group became more specific.

22.30 For industries the homogeneity assumption will not be fully met as some industry groups produce a wide range of products at the industry group level. Similarly to above, to classify industries as establishments or TAUs would make the tables too complicated, the tables would take too long to compile, and there would be confidentiality issues. Grouping industries will still result in secondary production, where the products have different input structures. For example, if the basic iron and steel industry also produces non-ferrous castings, the input structure for this column will show the use of non-ferrous metals, and the row will show sales of products to industries that use non-ferrous castings, and these results may not be suitable for users interested only in iron and steel products. Unless the production of secondary products forms a fixed proportion of the industry's output, the requirements calculated from this table could be misleading. Where secondary products are jointly produced, or the secondary product is a by-product of the primary production, the proportion of product mix should remain constant, but often there is no correlation between the primary and secondary products.

22.31 The extent of secondary production by an industry depends on the range of products produced by individual establishments, and whether the industries are grouped into large numbers of narrowly defined industries, or a small number of broadly defined industries. Where industries are narrowly defined, a large proportion of the products will be produced by industries to which the products are not primary. This conflicts with both the homogeneity requirement and the non-substitution requirement. Where significant proportions of a product can be substituted for by products produced by a different industry, there is a weak link between the demand for a product and the output of a single industry. Combining some of these industries could improve homogeneity in one respect, at the expense of creating a more heterogeneous product mix.

### Grouping of products and industries

22.32 The availability of source data will ultimately affect the grouping of products or industries. Detailed information of sales or output of products is normally available, but information on costs may not be available. In some cases only input structure detail may be available. A rolling program of case studies is used to gather detailed data on companies input and output structures, by direct interview with companies, in order to assist with this problem. The ABS industry groups as the main source data for the S-U and I-O tables

are collected in an annual industry collection (known as the Economic Activity Survey), and because detailed data on inputs is not generally available by product. In the past economic activity by some industries was redefined to more appropriate industries to limit the impact of secondary production on the tables but this is no longer done in order to reflect how production occurs in the economy.

22.33 Regardless of whether products or industries are used in quadrant 1, the same processes are followed to assemble the data. It is necessary to record the product flows in a way that is suitable to compile I-O tables. For each product or product group the same information is required:

- the origin or source of supply, domestic supply by industry, and imports;
- the use of the product, intermediate usage by industry and final demand by category; and
- the difference (margin) between the basic price and purchaser's price for each product.

22.34 The supply of imports must be classified in the same way as Australian production. Imports data is sourced from Customs data. This data is initially classified according to the Harmonised Tariff Item Statistical Code (HTISC) which is then concorded to the Input Output Product Classification (IOPC). The data enters the I-O tables as a vector. The disposition of imports data is made across industries based upon which industry would have produced the product had it been produced in Australia.

## DEVIATIONS FROM INTERNATIONAL STANDARDS

22.35 The I-O tables are an analytical tool which are compiled from the S-U tables. However, since they are analytical in nature, they can deviate to an extent from ASNA and 2008 SNA treatments in order to serve particular analytical purposes. The two main deviations are as follows and are described below in more detail:

- the SNA68 transport margin adjustment; and
- the c.i.f./f.o.b. adjustment.

22.36 The following is the list of aggregates where consistency is ensured between the I-O tables and the rest of the national accounts:

- household final consumption expenditure (at the published level as in 5204.0 Table 52 of the hardcopy version);
- government final consumption expenditure (total only);
- private gross fixed capital formation (total only);
- public corporations gross fixed capital formation (total only);
- general government gross fixed capital formation (total only);
- changes in inventories (total only);
- exports (total only including re-exports);
- imports (total only);
- compensation of employees (total only);
- gross operating surplus and gross mixed income (total only);
- taxes less subsidies on products;
- other taxes less subsidies on production and imports;
- income from dwelling rent - total gross rent;
- income from dwelling rent - consumption of financial services; and
- industry value added (industry level).

### The SNA68 transport margin adjustment

22.37 The System of National Accounts 1968 Transport Margin Adjustment (SNA68 TMA) aims to capture the transport charges for goods delivered by a third party, arranged by the producer without a separate invoice. I-O tables depart from the 2008 SNA in the definition of output at basic prices due to user requirement. SNA68 TMA ensures the same product is not being valued differently depending whether or not the producer charged separately for the delivery of the product.

22.38 The transport charges are removed from Australian production and added to the transport margins and thus reducing supply at basic prices. The amount of the adjustment is sourced from the EAS at the ANZSIC06 class level and aggregated to IOIG and disaggregated to product. The adjustment is applied to the products in four divisions; Agriculture, Forestry and Fishing; Mining; Manufacturing; and Arts and Recreation Services (applied to only one product of artistic originals).

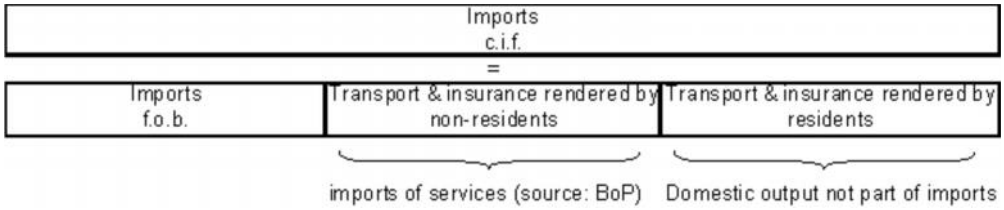
22.39 SNA68 TMA is only applied to primary production of Australian goods; wholly imported goods have zero SNA68 TMA. The adjustment is only applied to five transport margin types; Road, Rail, Water, Air and Stevedoring. For row balancing purposes as the output is decreased, the margin allocated to that product is increased respectively. The increase in the margin columns is offset by a decrease in Australian production at basic price. To balance the margin products in the output matrix, the margin product is increased and the transport non-margin product is decreased to balance the column. To complete the process, the imbalance in the output matrix of the non-margin product is offset with a respective decrease in the Intermediate Use of that product.

22.40 Overall, the supply at basic prices is reduced and the margins increased with the same amount, and supply at purchaser prices remains the same except for transport non-margin products. There are four quality checks that ensure the adjustment is applied properly:

1. no negative supply at BP;
2. no negative margins (except in margin products);
3. no change in supply at PP except for transport non-margin products; and
4. the sum of margins equals zero.

### The c.i.f./f.o.b. adjustment

22.41 Each imported good in the Input-Output tables is valued Cost Insurance Freight (c.i.f.) since it is the equivalent to the basic price of the same domestic product. However, total imports has to be valued Free on Board (f.o.b.) in accordance with BOP and National Accounts methodology. Transport and insurance services on imported goods may be performed by residents and non-residents. If the latter is a genuine import of services, the former is a domestic output and should not be treated as imports. Two operations are therefore necessary, first to reconcile detailed c.i.f. values with total imports f.o.b. and second to avoid the double counting of resident services:




22.42 The total adjustment corresponding to the transport and insurance services rendered by residents is, by construction, negative:

- transport and insurance services rendered by residents
= (imports f.o.b. - imports c.i.f.) + (transport and insurance rendered by non-residents)

22.43 The *Handbook of Input-Output Table Compilation and Analysis* recommends to present the c.i.f./f.o.b. adjustment in a separate item in the I-O tables. This presentation has not been adopted in the ABS I-O tables where the adjustment is added to the transport and insurance services rendered by non-residents as

explained above. These two items are allocated to non-margin water transport and non-margin air freight products. The sum of these two components is, by construction, negative.

22.44 A negative value in imports is conceptually correct and complies with the *U.N. Handbook of Input-Output Table Compilation and Analysis*. However, because negative values are incompatible with some analytical models, the ABS also compiles a different view of the tables by re-allocating this negative adjustment on imports to a positive adjustment on exports. The consequence is an increase by the same amount of both imports and exports.

22.45 The *Australian National Accounts: Input-Output Tables (Alternate View)* (cat. no. 5209.0.55.001) is available on request only. It is not released on the ABS website. The tables mirror what is published in the main I-O tables as outlined previously, with the exception of a different treatment of the c.i.f.-f.o.b. adjustment to better suit the needs of economic modellers.

## SPECIAL TREATMENTS ADOPTED IN COMPILING I-O TABLES

22.46 The symmetric I-O tables are sourced from the S-U tables, and the concepts and definitions used are the same as elsewhere in the ASNA. Issues of particular importance to the I-O tables include statistical units and the distinction between primary and secondary production.

22.47 The content and meaning of the I-O tables produced depend on some particular aspects of compilation including:

- the treatment of intra-industry transactions; and
- the allocation of imports.

### Intra-industry transactions

22.48 Depending on the treatment of intra-industry transactions, the output of an industry can be defined in three different ways according to whether, and to what extent, these transactions are counted as part of the output.

22.49 Firstly, the output of an industry can be defined as the total value of all flows of products produced by the units classified to the industry. All intra-industry flows are included as output when it is defined in this way. For example, under this definition, the output of the motor vehicles and parts; other transport equipment industry consists not only of fully assembled vehicles but also of motor bodies, engines and other components despatched from (or added to inventories by) any unit recognised as a unit for statistical purposes. This definition of output disregards the fact that many of these components will have been incorporated in finished motor vehicles and therefore will have been counted twice. Output calculated according to this definition could be as much as twice or three times the value of finished products of the industry.

22.50 A second definition of the output of an industry confines output to products produced by units within the industry and sold outside the enterprise. This definition also results in some duplication because the components manufactured and sold by one enterprise are all counted separately, although they may have been used in a finished product of another enterprise in the same industry and counted again in the value of this product. Moreover, the components despatched from one unit could be omitted entirely or counted either partly or wholly depending on whether they were used by another unit of the same enterprise or by a different enterprise.

22.51 Thirdly, the output of an industry can be defined as net of all intra-industry transactions, i.e. excluding not only the transfers between the unit in industry belonging to the same enterprise, but also all flows between units in industry belonging to different enterprises.

22.52 If the third definition of output is used, the I-O table is said to be net and the main diagonal of an industry-by-industry table is empty. If either the first or second definition of output is used the I-O table is said to be gross and there are entries on the main diagonal.

22.53 For 1974–75 and subsequent years, the ABS I-O tables generally include intra-industry flows and can be described as gross as outlined above. This means that the estimates of output can be directly compared with other information about an industry.

22.54 A further consequence of recording intra-industry transactions is that the level of output is unaffected by the number of industries used (i.e. by different levels of industry aggregation). An important exception is the construction industry, in which output was measured on a net basis prior to the 2001-02 tables.

### Allocation of imports

22.55 Information regarding the use of imports in the economy is not generally available because it is impractical to collect data on how imported products are used. For analytical purposes, the ABS models the use of imports in the intermediate and final use categories using a number of assumptions. In an indirect allocation of imports approach, imports are not distinguished from domestically produced products and their use is therefore based on their contribution to the total supply. Specific rules also determine the disposition of imports which, by definition cannot be allocated to domestic exports but must be allocated to re-exports.

22.56 Various ways are available to record imports in input-output tables. The main ones are:

- direct allocation of imports – involves allocating all imports directly to the industries which use them. In this case, all flows recorded in quadrants 1 and 2 refer only to the use of domestic products, and consequently quadrant 1 does not reflect the technological input structure of the industry;
- indirect allocation of imports – involves first recording all imports as adding to the supply of the industry to which they are primary and then allocating this supply along the corresponding row of the table to using industries. The result is that flows in quadrants 1 and 2 contain imported and domestically produced products without distinction. Quadrant 1 then better reflects the technological input structure of the industry and quadrant 2 better reflects the product composition of final demand; and
- direct allocation of complementary imports and indirect allocation of competing imports – this method involves first distinguishing between complementary and competing imports and then allocating the first group directly and the latter indirectly. Complementary imports are defined as those for which no suitable substitute is produced domestically, but determining what is a suitable substitute is largely a matter of judgement. As complementary imports ceased to be separately distinguished from the 2001-02 tables onwards this method is not available in the published ABS I-O tables.

22.57 Each of these methods has advantages from an analytical point of view but each also can lead to conceptual and compilation problems.

22.58 Direct allocation of imports is appropriate for many analytical purposes. However, if substitution between imports and domestic production is known to occur, in order to allow for the probable effects of specified import replacement or substitution it would be necessary to adjust the imports table and to recalculate the industry-by-industry tables. In addition, the application of this method requires identification of the destination of each imported product. Although the proportion of imports in total supply (and therefore in total usage) for each product can be established, it may not be known for individual using industries. Of course, it is possible to proceed if one assumes that each using industry draws on imports and domestic production in the average proportions established for the total supply of each product. In the I-O publication, tables with direct allocation of competing imports have been prepared using this assumption. The assumption was applied to detailed working tables (approximately 1,280 products and 112 industries) which were subsequently aggregated for publication.

22.59 Indirect allocation of imports is appropriate, in the sense that it will result in stable input-output coefficients, where the inputs to the domestic industry to which each imported product is primary are representative of the inputs required to produce the import domestically. Where this is not so, the method will give misleading results. For instance, if coffee (which could be treated as a complementary import) were distributed with the 'other agriculture' product group, an increase in the demand for coffee would necessitate an increase in the output of the 'other agriculture' industry. This, in turn, would require an increase in the inputs to that industry as specified in the published tables unless a specific adjustment is made to the tables. It is easy to compile tables using the indirect allocation method. The initial problem which has to be overcome is matching each imported product with the domestic industry to which the product is primary, or would have been primary if it were produced domestically.

## COVERAGE OF TRANSACTIONS

22.60 Input-output tables record only those flows of goods and services that have been domestically produced, imported or drawn from domestic inventories during the reference period. Therefore some transactions are outside the scope of the input-output tables and so are not recorded in them. The most important exclusions are financial transactions, such as loans, interest and the purchases of securities.

22.61 Other transactions have to be modified before they can be included in the tables. For instance, flows of products are commonly reported as sales and purchases, but the input-output tables should record output and usage. Output will differ from sales, and input (or usage) will differ from purchases, by the amount of inventory change (positive or negative) in both cases. Output is calculated as sales plus changes in inventories of finished goods plus changes in inventories of work-in-progress, and input is calculated as purchases less changes in inventories of materials. Changes in inventories are recorded in a separate final demand column in the row of the industry of origin. Entries in this column refer to changes in inventories of both domestically produced and imported products, regardless of whether they are held by producers, dealers or intermediate users.

22.62 Input-output tables include some elements which are not market transactions, such as the imputed rent of owner-occupied dwellings and some home-produced food.

22.63 For analytical purposes, they also include own use of some energy products such as gas or electricity.

22.64 Estimates for own account computer software and research and development are also included to estimate output.

### VALUATION OF TRANSACTIONS

22.65 The flows in input-output tables can be valued in several ways. The choice depends partly on the intended use of the tables and partly on availability of data (including the assumptions that can reasonably be made where data are lacking). The valuation conventions most commonly used are basic prices, producers' prices and purchasers' prices. These are defined as follows:

- basic price – the amount receivable by the producer from the purchaser for a unit of a good or service produced as output, minus any tax payable, and plus any subsidy receivable, on that unit as a consequence of its production or sale. It excludes any transport charges invoiced separately by the producer, and an adjustment is made to exclude delivery charges that are not separately invoiced, organised by the producer and delivered by a third party.
- producer's price – the amount receivable by the producer from the purchaser for a unit of a good or service produced as output, including any tax that is incorporated within the sales price, and excluding any subsidy that reduces the sales price, on that unit as a consequence of its production or sale. It excludes any transport charges invoiced separately by the producer, and an adjustment would be made to exclude delivery charges that are not separately invoiced, however, producer's price is not used in the Australian I-O tables.
- purchaser's price – the amount paid by the purchaser in order to take delivery of a unit of a good or service at the time and place required by the purchaser. It includes any transport charges paid separately by the purchaser to take delivery at the required time and place. GST paid by producers for which input credits are granted is excluded from purchasers' prices.

22.66 The difference between the cost of a product to the purchaser and the basic price receivable by the producer is composed of taxes less subsidies on products and margins such as transport and storage services, marine insurance, and wholesale and retail margins. Regardless of whether the producer or the purchaser initially pays for the margins, the concept of producer's price excludes the margins and the concept of purchaser's price includes them.

#### Special valuation issues

##### Basic margins

22.67 If the transactions are valued at basic prices, the margins are recorded as inputs from the appropriate industry (e.g. transport, wholesale trade) to the intermediate users or final buyers, as the case may be. If transactions are valued at purchasers' prices the value of the margins is added, along with taxes less subsidies on products, to the basic price of the good to which the margins relate. The input into the intermediate or final use category of the transport or wholesale trade industry is reduced by a corresponding amount.

22.68 Whichever method is used, a complicated estimation process will be necessary before the transactions can be valued in one of these ways. First, input and output statistics from economic statistics collections are not available on the same valuation basis. Most output statistics are on an ex-plant or similar basis, but input statistics are normally available at the price paid by the user. Second, margins apply only to those flows of

products which have actually passed through the 'margin' industries. Any products delivered directly from producer to user, without intervention of 'margin' industries, are obviously unaffected by margins.

22.69 The incidence of margins can vary considerably between users, depending on the channels through which they obtain their supplies. For instance, most producers would not buy supplies to meet their requirements through retailers, while practically all households do so.

22.70 The supply of product groups containing margin products consists of two parts: that which involves the movement of goods and that which represents other (non-margin) products. Only the first of these parts (e.g. freight of goods by rail or road) is treated as margin, and this part is allocated differently depending on whether the flows are at basic prices or at purchasers' prices. The second part (e.g. railway fares) is treated as non-margin and is always shown as paid by purchasers.

Taxes and subsidies on products;

22.71 The treatment of taxes on products in input-output tables creates special problems which can only be solved by the use of conventions.

22.72 The concept of producers' price includes taxes on products. If transactions are valued at producers' prices, taxes on products are recorded as being paid by producers. However, taxes on products do not accrue to producers, are not levied on all products, and can vary significantly between different uses and over time, for reasons which have nothing to do with production. For instance, GST may not be payable on exports or on government purchases of some products, but it may be quite high on the same products bought for personal consumption. Therefore, if taxes on products were included in the value of products on which they are levied, the flows would not be valued uniformly and the subsequent manipulation of the tables could give quite erroneous results.

22.73 This problem can be avoided by recording the product flows at the value at which they leave the producers before product taxes are charged, and showing these taxes separately from the product flows where they arise. When this method is adopted, the flows are valued at basic prices and this is the basis of valuation adopted in most tables in the I-O publication. In these tables all flows of products exclude taxes on products. These taxes are shown in separate rows. Taxes on products are shown as being paid by the users of the products on which the taxes are levied, except for GST paid by producers and for which input credits are granted. Other non-deductible GST is allocated to final consumers.

22.74 Other taxes on production are shown as being paid by the industry that incurred them. In tables at purchasers' prices, taxes on products are shown as paid by the producer of products subject to tax. As with margin elements, this treatment of taxes on products can result in lack of uniform valuation of product flows and in the distortion of input-output relationships.

22.75 Product specific subsidies are treated as negative taxes on products, and the amounts shown in a separate row representing the difference between the two.

22.76 In tables at basic prices, taxes on products are recorded as paid by purchasers. If the purchasers' also bought some products which attract a subsidy, the amount of subsidy is deducted from taxes on products paid by them.

## CLASSIFICATIONS

22.77 The industrial classification used for the 2006-07 and later I-O tables is the Input Output Industry Group (IOIG) which is based on the *Australian and New Zealand Standard Industrial Classification, 2006 (ANZSIC06)* (see Appendix 1). ANZSIC06 is applied to the TAU which form the starting point for the I-O industries.

22.78 Some I-O industries correspond to a single ANZSIC class, but it is not possible to have an industry for every class. The aim is to provide a balanced view of the structure of the economy, and to be able to compare the latest I-O tables with earlier versions.

22.79 In I-O tables produced prior to the 2001-02 tables, where practical, the process of 'redefinition of industries' was applied where units defined to an industry had significant production of products primary to another industry which had a different pattern of inputs. This secondary output was treated as output of the industry to which production was primary. This resulted in lower levels of secondary production than in tables compiled from the 2001-02 tables onwards when the redefinitions were ceased. The redefinitions affected

mainly the trading activity of miners and manufacturers, which was redefined to retail and wholesale trade, and any significant manufacturing activity of wholesalers which was redefined to the appropriate manufacturing industry.

22.80 The product classification used in the I-O tables is the Input-Output Product Classification (IOPC) which is based on the *Central Product Classification , Version 2* (CPC, Ver. 2) and is consistent with the ANZSIC06. The IOPC is an industry-of-origin product classification that has been specifically developed for the compilation and application of Australian (I-O) tables. Because the I-O system describes the production and subsequent use of all goods and services, an I-O product classification needs to be defined in terms of characteristic products of industry sectors. The overall principles for the preparation of such an industry-of-origin product classification include:

- homogeneity of inputs – each product or product group should consist of items that have similar input structures or technology of production. This principle is generally applied through the definition of each IOPC item in terms of the ANZSIC industry in which it is mainly produced; and
- homogeneity of disposition – each product or product group, having satisfied the first criterion, should consist of items that have similar patterns of disposition or usage. This principle is applied by reference to the description of source data items and information about the transport, distribution and product taxation margins applying to particular products.

22.81 Details of the latest version of the I-O Product Classification (IOPC) introduced in 2012 and concordances to the previous version of the concordance are available in the ABS publication *Australian National Accounts: Input-Output Tables - Electronic Publication* (cat. no. 5209.0.55.001).

22.82 Much of the data that is used to populate the I-O tables is initially classified to other classifications. Therefore concordances are required to map those classifications to the I-O classifications.

22.83 Concordances between the IOPC and CPI 16th series classification, the I-O industry group (IOIG) and ANZSIC06, and IOIG to Household Expenditure Classification (HEC) are also available in the ABS publication *Australian National Accounts: Input-Output Tables - Electronic Publication* (cat. no. 5209.0.55.001).

## THE I-O APPROACH TO COMPILING THE NATIONAL ACCOUNTS

22.84 The 2008 SNA recommends use of the I-O framework for compiling basic data, integration of the I-O tables within the national accounts, and compilation of I-O tables at constant prices as well as at current prices. Currently S-U tables are compiled in both current and constant prices, whereas the I-O tables are compiled only in current prices.

22.85 The 2008 SNA also recommends that commodity flows data (by-products of the goods and services account) should be compiled at least annually, and that these data should be fully consistent with other parts of the national accounts.

22.86 Since 1994-95, the annual GDP account has been compiled using the 'I-O approach' where the compilation of the GDP account is fully integrated with the compilation of the I-O tables. The GDP account provides three approaches to measuring GDP: summing the incomes generated by production; summing final expenditures on commodities produced; and summing the value added at each stage of production. I-O tables are a further disaggregation of the same three approaches. Intermediate consumption is netted out from the GDP account, however, I-O tables bring these inter-industry flows of commodities back into focus, providing a more developed articulation of the process of economic production, structure and interrelationships of industries. An important feature of the I-O tables is that they are fully balanced matrices which allow for data confrontation and the resolution of differences at a detailed level.

22.87 The 2008 SNA chapter 14 provides a description of the full I-O framework for compiling a set of national accounts. A distinction is drawn between (S-U) tables and analytical, or symmetric, I-O tables. The process of benchmarking the GDP account to balanced S-U tables is referred to as the I-O approach. The analytic I-O tables are compiled as the second stage of this process when the S-U tables for a particular year are deemed to be final.

22.88 The I-O approach to compiling the GDP account involves benchmarking the annual and quarterly current price GDP accounts to the balanced S-U tables. The S-U tables for each year are compiled three times: first preliminary tables; second preliminary tables; and final tables. The GDP account is benchmarked at each of these three stages. The benchmarked GDP account is published first in the September quarter issues of the ASNA. This strategy means that the quarterly accounts will never be projected more than eight quarters from a balanced set of annual accounts. Apart from the most recent year and the June quarter national accounts in

the *Australian National Accounts: National Income, Expenditure and* Product (cat. no. 5206.0) (for which a balanced estimate is not available) there will be only one measure of annual GDP, and consequently no statistical discrepancies in annual terms.

22.89 As explained in Chapter 7, the compilation of balanced S-U tables requires three iterations. The sequence of S-U and I-O tables is scheduled for completion according to the following timetable:

| | | |
|---|---|---|
| 1st preliminary | end of year t + 12 | months |
| 2nd preliminary | end of year t + 24 | months |
| Final S-U tables | end of year t + 36 | months |
| I-O tables (*based on 2nd preliminary S-U tables*) | end of year t + 38 | months |

22.90 As an example , for reference year 2007-08, the first preliminary S-U tables were completed at the end of June 2009. The second preliminary version of these tables was completed in June 2010, and the I-O tables were completed and published in October 2011.

22.91 This approach ensures the measures of current price annual GDP and its components are consistent between the S-U tables, the I-O tables and the GDP accounts published in *Australian System of National Accounts, 2010-11* (cat. no. 5204.0), at the time that the I-O tables are compiled.

22.92 As previously stated, I-O tables are not revised once they have been finalised, whereas the S-U tables and the GDP accounts may be revised for all periods whenever an historical revision is undertaken, and therefore are a consistent time series. This difference allows more flexibility to incorporate changes in the I-O tables which are not produced as time series while structural changes in S-U tables can only be incorporated during historical revisions.

22.93 Changes made in the I-O tables resulting from the balancing process are incorporated in the rest of the national accounts via the S-U framework. The S-U tables incorporate changes resulting from the I-O balancing process either during the compilation phase prior to the finalisation of the S-U tables or during a historical revision.

## SOURCES AND METHODS

### Data sources

22.94 The starting point for compiling the I-O tables is the balanced S-U table underlying the benchmarks of GDP for the national accounts. The detail on how the GDP annual benchmarks are compiled is outlined in Chapter 9 Gross domestic product – production approach (GDP(P), Chapter 10 Gross domestic product – expenditure approach (GDP(E) and Chapter 11 Gross domestic product – income approach (GDP(I).

22.95 Note the Economic Activity Survey (EAS) data is the primary data source to compiling gross value added in the S-U tables. However it does not support the level of product detail required to compile the I-O tables. Therefore the EAS data is supplemented by a program of targeted industry case studies, where companies are interviewed for detailed information that is used to improve product level data on supply and intermediate use.

22.96 This section details how the S-U tables are disaggregated, from the SUPC and SUIC levels, to IOPC and IOIG levels, by component of the I-O tables. However it is useful to summarise some of the issues and sources used to compile the S-U tables, see the table below:

Table 22.6 SUPPLY AND USE TABLES DATA SOURCES—by component

| Item | Comment |
|---|---|
| **Output** | Output is the production of goods and services for use as inputs into the production process of an industry, or as final demand. Own production and use of some energy products and transportation not separately invoiced are not shown separately and are included as part of an industry's output.<br><br>The main data sources used to compile output in the Supply and Use tables are the Economic Activity Survey, Government Finance Statistics and the Australian Prudential Regulatory Authority.<br><br>However industry specific data sources may also be used. Chapter 9 outlines in detail the data sources and methods used to compile output by industry.<br><br>A number of adjustments are made to the source EAS data in the S-U tables, namely:<br>▪ off-June year reporting;<br>▪ understatement of income for certain industries; and<br>▪ own account computer software and R&D. |
| **Intermediate consumption** | Intermediate consumption consists of the value of goods and services consumed as inputs to the production process.<br><br>The main data sources used to compile intermediate consumption in the Supply and Use tables are the Economic Activity Survey and Government Finance Statistics.<br><br>A number of adjustments are made to the source EAS data in the S-U tables, namely:<br>▪ off-June year reporting;<br>▪ overstatement of expenses for certain industries;<br>▪ financial intermediation services indirectly measured (FISIM); and<br>▪ insurance service charge. |
| **Household final consumption expenditure** | Household final consumption expenditure (HFCE) consists of the expenditure incurred by households on individual consumption goods and services.<br><br>The HFCE benchmark data is sourced from the periodic Retail and Wholesale Industry Survey (RISWIS) and the Household Expenditure Survey (HES). For years when the RISWIS and HES data are not available, the annual estimate is the sum of the four quarters. Between survey years the Retail sales survey is used as an indicator for merchandise items, and a range of relevant indicators are used for services. |
| **Government final consumption expenditure** | Government final consumption expenditure (GFCE) consists of the expenditure incurred by general government on both individual consumption goods and services and collective consumption services.<br><br>The main data source used to compile GFCE in the Supply and Use tables is the Government Finance Statistics.<br><br>GFS data are classified according to the General Purpose Classification (GPC) and the Local Government Purpose Classification (LGPC). |
| **Gross fixed capital formation** | Gross fixed capital formation (GFCF) is equal to the total value of a producer's acquisitions, less disposals, of fixed assets plus capital work done on own account plus certain additions to the value of non- |

produced assets realised by the productive activity of institutional units (i.e. land improvements). Estimates of GFCF are primarily disaggregated between the private and public sectors.

There are a range of data sources used to compile private GFCF in the Supply and Use tables including:

- Economic Activity Survey;
- Construction Industry Survey;
- Building Activity Survey;
- Engineering Construction Survey;
- Survey of New Capital Expenditure;
- Value of Agricultural Commodities Produced;
- Survey of Research and Experimental Development;
- Surveys on Mineral and Petroleum Exploration; and
- Household Expenditure Survey;

The main data source used to compile public GFCF in the Supply and Use tables is the Government Finance Statistics.

GFCF is classified by type of asset.

**Changes in inventories**

Changes in inventories are defined to include changes in holdings of goods for sale (whether of own production or purchased for resale), work-in-progress and raw materials to be used as intermediate inputs into production.

The main data sources used to compile total changes in inventories in the Supply and Use tables are the Economic Activity Survey and Government Finance Statistics.

**Exports of goods and services**

Exports of goods and services are defined as being domestically produced output acquired by non-residents.

The primary source used to compile exports of goods is the ABS International Merchandise Trade Statistics. Balance of Payments adjustments to coverage, timing and valuation are applied, using data from the Survey of International Transport Enterprises, the Reserve bank of Australia and the Survey of International Trade in Services.

The principal sources used to compile exports of services are the ABS International Merchandise Trade Statistics, the cost, insurance and freight/free on board (c.i.f./f.o.b.) model and the Survey of International trade in services.

**Imports of goods and services**

Imports of goods and services are defined as being the outputs produced by non-residents but acquired by residents.

The principal source used to compile imports of goods is the ABS International Trade Statistics. Balance of Payments adjustments to coverage, timing and valuation are applied, using data from the Survey of International Transport Enterprises, the Reserve bank of Australia and the Survey of International Trade in Services.

The principal sources used to compile imports of services are the ABS International Merchandise Trade Statistics, the cost, insurance and freight/free on board (c.i.f./f.o.b.) model and the Survey of International trade in services.

**Compensation of employees**

Compensation of employees is defined as being the total remuneration, in cash or in kind, payable to an employee in return for work done. It comprises wages and salaries and employers' social contributions.

The main data sources used to compile compensation of employees in the Supply and Use tables are the Economic Activity Survey, Survey of

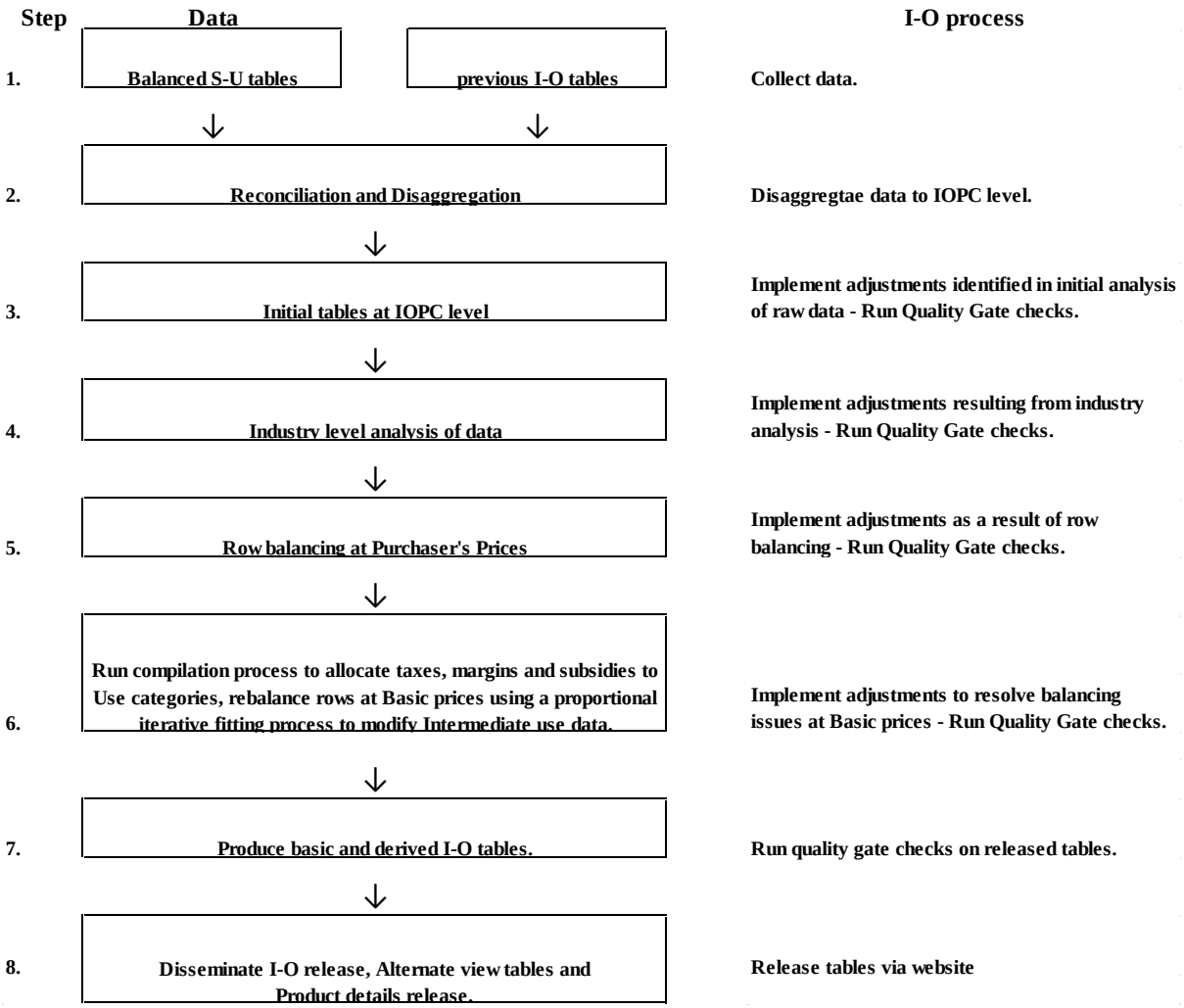
| | |
|---|---|
| | Employment and Earnings, Survey of Major Labour Costs and the Australian Prudential Regulatory Authority. |
| **Gross operating surplus/gross mixed income** | Gross operating surplus (GOS) is defined as being the income from production of corporate enterprises, while gross mixed income (GMI) is the income from production of unincorporated enterprises.<br><br>GOS is calculated as gross value added less compensation of employees less net taxes on production and imports for all industries/institutional sectors except:<br>▪ finance – which is derived using various data sources including APRA and RBA data;<br>▪ insurance and pension funds – which is derived using various sources including APRA data;<br>▪ health care and social assistance – which is derived using the Quarterly Business Indicator Survey and Government Finance Statistics;<br>▪ general government - which are equivalent to consumption of fixed capital on general government assets; and<br>▪ public non-financial corporations – which is derived using Government Finance Statistics.<br><br>GMI is derived as the residual once all of the other institutional sectors GOS (i.e. private non-financial corporations, public non-financial corporations, general government and financial corporations GOS) is estimated. |
| **Taxes less subsidies on production and imports** | Taxes on production and imports consist of taxes on products (i.e. taxes on goods and services when they are produced, delivered or sold and duties on imports) and other taxes on production (i.e. taxes related to the payroll, land taxes, taxes on pollution, stamp duties, etc.).<br><br>Subsidies on production consist of subsides on products (i.e. subsidies on goods and services when they are produced, delivered or sold) and other subsidies on production (i.e. subsidies related to the payroll or workforce).<br><br>The main data source used to compile taxes less subsidies on production and imports in the Supply and Use tables is the Government Finance Statistics. |

## The I-O compilation process

22.97 The I-O compilation begins with the finalisation of the S-U tables, when the balanced S-U levels are disaggregated to I-O levels. This results in unbalanced I-O tables which are then balanced using the product flow method. The product flow method involves a number of steps followed by a quality assessment process at strategic points to check data quality and consistency.

22.98 The figure below shows the steps undertaken in the I-O compilation process. The steps are then described in more detail.

Figure 22.1 The I-O compilation process




Step 1 Collect source data

22.99 Obtain the S-U tables and previous I-O tables.

Step 2 Reconciliation and disaggregation

22.100 Balanced S-U tables are disaggregated to populate the I-O tables ensuring consistency with the rest of national accounts published aggregates.

22.101 The initial data used to populate the S-U tables is classified to the IOPC and IOIG level and then aggregated to the Supply Use Product Classification (SUPC) and Supply Use Industry Classification (SUIC) level. It is at this level that the balancing process of the S-U table is undertaken in order to produced balanced GDP estimates for the national accounts. Therefore it is necessary to disaggregate the S-U products and industries to the I-O level in order to produce the I-O tables.

22.102 However, the disaggregation of the S-U level to the I-O level does not necessarily result in the same I-O distribution compared with the initial I-O distribution. This is due to the balancing being undertaken at the S-U level and any adjustments made at that level may result in a different S-U level total than the initial total. This difference has to be distributed to the I-O level and, depending on the component, this is done in several ways.

22.103 The following table outlines how the S-U level components are disaggregated to the I-O level.

Table 22.7 DISAGGREGATION OF S-U LEVEL TO I-O LEVEL—GDP(P)

| Industry | Supply | Intermediate consumption |
|---|---|---|
| **Agriculture, forestry and fishing** | | |
| **Agriculture** | Economic Activity Survey (EAS) ANZSIC class level data are mapped to Input-Output Product Classification (IOPC) using weights derived from Value of Agricultural Commodities Produced (VACP) product data and previously published Input-Output (I-O) weights. Any adjustments made during the Supply-Use (S-U) balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Forestry, aquaculture, fishing, hunting, trapping and services to agriculture, forestry and fishing** | EAS ANZSIC class level data are mapped directly to primary Input-Output Product Group (IOPG). IOPG data are then mapped to IOPC using weights derived from previously published I-O data. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Agriculture, forestry and fishing support services** | EAS ANZSIC class level data are mapped to primary IOPG. IOPG data are then mapped to IOPC using weights derived from previously published I-O data except for data supplied directly from source data at IOPC level, e.g. ABARES ginned cotton. Any adjustments made during the SU balancing process are split back to IOPC based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Mining** | | |
| **All except exploration and mining support services** | State Mines product detail is mapped directly to IOPC. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Exploration and mining support services** | IOPC detail is a combination of EAS, Mineral Exploration and Petroleum Exploration data. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Manufacturing** | EAS ANZSIC class level data are mapped to IOIG's and then split into primary IOPCs according to historical weights and the EAS data items. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Electricity, gas, water and water services** | EAS ANZSIC class level data are mapped to IOIG's and then split into primary IOPCs | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the |

| | | |
|---|---|---|
| | according to historical weights and the EAS data items. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Construction** | EAS ANZSIC class level data are mapped to IOIGs and then split into primary IOPCs according to historical weights adjusted for the movement in the Building Activity and Engineering Construction Surveys. As the Supply-Use Product Classification (SUPC) and IOPC are a one to one match any adjustments made during the S-U balancing process are applied directly back to the IOPCs. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Wholesale trade** | EAS ANZSIC class level data are used to derive output which is mapped to IOPC based on historical proportions from previous retail and wholesale industry surveys and weights derived from previously balanced I-O tables. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Retail trade** | EAS ANZSIC class level data are used to derive output which is mapped to IOPC based on historical proportions from previous retail and wholesale industry surveys and weights derived from previously balanced I-O tables. Any adjustments made during the S-U balancing are split back to the IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Accommodation and food services** | EAS ANZSIC class level data are mapped to primary IOPCs. Proportions are derived from ABS publications *Accommodation Services, Australia* (cat. no 8695.0), *Clubs, Pubs, Taverns and Bars*, *Australia* (cat. no. 8687.0) and *Cafes, Restaurants and Catering Services, Australia* (cat. no. 8655.0). Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Transport, postal and warehousing** | EAS ANZSIC class level data are mapped to IOIG's and then split into primary IOPCs according to historical weights. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Information media and telecommunications** | EAS ANZSIC class level data are mapped to IOIGs and then split into primary IOPCs using previously balanced I-O Tables weights. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |

| | | |
|---|---|---|
| **Financial and insurance services** | | |
| **Finance and Insurance and superannuation funds** | Data is compiled at the IOPC level. For details on the sources and methods used to compile finance and insurance and superannuation funds output data see Table 9.21 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Finance services, subdivision 62 and Table 9.22 ANNUAL GROSS VALUE ADDED BY INDUSTRY—Insurance and superannuation funds, subdivision 63.<br><br>Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Finance and insurance services** | EAS ANZSIC class level data are mapped to IOIGs and then split into primary IOPCs using previously balanced I-O Tables weights. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Rental, hiring and real estate services, except ownership of dwellings** | EAS ANZSIC class level data are mapped to primary IOPCs according to historical weights. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Professional, scientific and technical services** | EAS ANZSIC class level data are mapped to IOIG's and then split into primary IOPCs according to previous balanced I-O table weights. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Administrative and supportive services** | EAS ANZSIC class level data are mapped to IOIG's and then split into primary IOPCs according to previous balanced I-O table weights. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Public administration and safety** | Government Finance Statistics (GFS) gross expenditure data is classified according to the Government Purpose Classification (GPC). The GPC is mapped to the IOPC based on historical I-O weights and aggregated to the SUPC level. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Education and training** | Government Finance Statistics (GFS) gross expenditure data is classified according to the Government Purpose Classification (GPC). The GPC is mapped to the IOPC based on historical I-O weights and | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |

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| | aggregated to the SUPC level. EAS ANZSIC class level data are mapped to IOIG's and then split directly into primary IOPCs except for ANZSIC class 8023 Combined primary and secondary education, which is split evenly between IOPC 80200010 Primary education services and IOPC 80200020 Secondary education services. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | |
| **Health care and social assistance** | Supply is derived using the demand side approach which sums the intermediate consumption of health and social assistance related products and final demand (i.e. final consumption expenditure, and exports less imports). These data are compiled at the IOPC level. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Arts and recreation services** | | |
| **Arts and recreations services, except gambling** | EAS data by ANZSIC Class level and institutional sector are mapped to primary IOPCs according to historical weights. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Gambling** | Supply is derived using the demand side approach which sums the intermediate consumption of gambling products and final demand (i.e. final consumption expenditure, and exports less imports). These data are compiled at the IOPC level. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Other services** | | |
| **Repairs and maintenance** | EAS ANZSIC class level data are mapped to IOIG's and then split into primary IOPCs according to historical weights and the EAS data items. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Personal and other services** | Supply is derived using the demand side approach which sums the intermediate consumption of personal and other services products and final demand (i.e. final consumption expenditure, and exports less imports). These data are compiled at the IOPC level. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |

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| **Ownership of dwellings** | Estimates for actual and imputed rent, consumption of fixed capital (COFC) and trade data are all compiled at the IOPC level. The output of residential caravan parks is derived using the movement in service income from the EAS data for this ANZSIC class and applied to the estimate of the previous year. Any adjustments made during the S-U balancing process are split back to IOPCs based on the original IOPC proportions. | Intermediate consumption is disaggregated to the IOIG and IOPC level based on the final Total Intermediate Use (TIU) matrix from the previous year's I-O tables. |
| **Taxes less subsidies on products** | Government Finance Statistics data classified by purpose and tax type are mapped to the I-O level using historical weights and other observed taxation statistics data. Data are compiled at the IOPC level and aggregated to SUPC for SU tables.<br><br>Taxes are not adjusted during the S-U balancing process. | |
| **Trade and transport Margins** | The most recent I-O Table's distribution of margin by IOPC for each margin type is used to allocate each margin to a product. | |

Table 22.8 DISAGGREGATION OF S-U LEVEL TO I-O LEVEL—GDP(E)

| Item | Disaggregation method |
|---|---|
| **Household final consumption expenditure (HFCE)** | HFCE data are compiled according to the Classification of Individual Consumption by Purpose (COICOP) and is disaggregated to IOPC level based on balanced S-U table and previous year's I-O table.<br><br>Any adjustments made through the S-U balancing process are applied to the appropriate IOPC based on the intelligence for the decision. If detailed information is not known, it is allocated based on previously balanced I-O tables. |
| **Government final consumption expenditure (GFCE)** | GFCE data are compiled according to the Government Purpose Classification (GPC) which is mapped to IOPC using historical input-output weights and aggregated for the S-U tables.<br><br>Any adjustments made during the S-U balancing process are applied to the appropriate IOPC based on the intelligence for the decision. If detailed information is not known, it is allocated based on previous I-O tables. |
| **Gross fixed capital formation (GFCF)** | GFCF data are compiled according to asset type by sector. With the exception of machinery and equipment all asset types align with the IOPC. Machinery and equipment is disaggregated to IOPC level based on previous years I-O tables and converted into current year prices using price indexes.<br><br>Any adjustments applied during the balancing process are based on an informed assessment of how and why the imbalance has occurred. In cases where the required level of detail cannot be sourced, the allocation is based on previously balanced I-O tables or the original proportions of the correspondence. |
| **Changes in inventories** | Changes in inventories is distributed across IOPCs based on how changes in inventories is distributed across IOPCs in the latest set of balanced I-O tables. |
| **Exports of goods and services** | International trade data is mapped to the IOPC using the Australian Harmonised Export Commodity Classification (AHECC) to IOPC correspondence. Further adjustments based on Balance of Payment (BOP) data are made to the relevant IOPCs where appropriate. |

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| | Further adjustments at the IOPC level may be required for product and industry balancing purposes. All such adjustments are offsetting to ensure that total exports remain unchanged. |
| **Imports of goods and services** | International Trade data is mapped to the IOPC using an Harmonised Tariff Item Statistical Classification (HTISC to IOPC correspondence. Further adjustments based on Balance of Payment (BOP) data are made to the relevant IOPCs where appropriate.<br><br>Further adjustments at the IOPC level may be required for product and industry balancing purposes. All such adjustments are offsetting to ensure that total imports remains unchanged. |

Table 22.9 DISAGGREGATION OF S-U LEVEL TO I-O LEVEL—GDP(I)

| Industry/Item | Compensation of employees | Gross operating surplus/Gross mixed income | Other taxes less subsidies on production |
|---|---|---|---|
| **Agriculture, forestry and fishing** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG level based on industry evidence. | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during S-U Table balancing process are allocated to IOIGs using IOIG proportions when originally compiled. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |
| **Mining** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during S-U Table balancing process are allocated to IOIGs | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |

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| | | using the output proportions. | |
| **Manufacturing** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during the S-U Table balancing process are allocated to IOIGs using IOIG proportions from when originally compiled. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |
| **Electricity, gas, water and water services** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during the S-U Table balancing process are allocated to IOIGs using IOIG proportions from when originally compiled. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |
| **Construction** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |

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| | level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during the S-U Table balancing process are allocated to IOIGs using IOIG proportions from when originally compiled. | |
| **Wholesale trade** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during S-U Table balancing process are allocated to IOIGs directly as SUICs and IOIGs have a one to one relationship. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |
| **Retail trade** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during S-U Table balancing process are allocated to IOIGs directly as SUICs and IOIGs have a one to one relationship. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |

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| **Accommodation and food services** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during S-U Table balancing process are allocated to IOIGs directly as SUICs and IOIGs have a one to one relationship. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |
| **Transport, postal and warehousing** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during the S-U Table balancing process are allocated to IOIGs using IOIG proportions from when originally compiled. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |
| **Information media and telecommunications** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |

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| | level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during S-U Table balancing process are allocated to IOIGs directly as SUICs and IOIGs have a one to one relationship. | |
| **Financial and insurance services** | There is a one to one mapping between the IOIG and SUIC for this industry. This means that movements at the IOIG level are consistent with those in the S-U table benchmarks .<br><br>Tables 11.1 and 11.2 provide details on the sources and methods used to compile COE for financial corporations. | For SUIC 620 Finance and SUIC 630 Insurance and Superannuation Funds, GOS is compiled from source data at IOIG level.<br><br>For SUIC 640 Auxiliary Finance and Insurance Services, GOS is derived as a residual item from EAS data, also at the IOIG level.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |
| **Rental, hiring and real estate services, except ownership of dwellings** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during S-U Table balancing process are allocated to IOIGs directly as SUICs and IOIGs have a one to one relationship. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |
| **Professional, scientific and technical services** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level |

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| | based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during S-U Table balancing process are allocated to IOIGs directly as SUICs and IOIGs have a one to one relationship. | using historical weights and other observed taxation statistics data. |
| **Administrative and supportive services** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC Division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations and unincorporated enterprises during S-U Table balancing process are allocated to IOIGs using IOIG proportions when originally compiled. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |
| **Public Administration and Safety** | For SUIC 750 Government administration and regulatory services and 770 Public Order and Safety, data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Government data are received at the ANZSIC division level and are disaggregated between these two IOIGs using their proportions of general government output.<br><br>For SUIC 760 Defence, defence wages and salaries are mapped directly to this IOIG.<br><br>Other data received or calculated at an ANZSIC division level (e.g. payment in | General government GOS is equivalent to the value of consumption of fixed capital on general government assets as derived in the perpetual inventory model.<br><br>This division contains minimal private non-financial corporations GOS. It is derived directly from EAS ANZSIC class level data.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |

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| | kind and Fringe Benefits Tax) are disaggregated to IOIG level using either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC. | during S-U Table balancing process are allocated to IOIGs directly as SUICs and IOIGs have a one to one relationship. | |
| **Education and Training** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | Gross operating surplus/Gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during S-U Table balancing process are allocated to IOIGs directly as SUICs and IOIGs have a one to one relationship. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |
| **Health Care and Social Assistance** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | Gross operating surplus (GOS) and gross mixed income is taken from 5204.0 (Total Factor Income by Industry and principal components – Current prices) at division level. General Government GOS is subtracted from the division level GOS/GMI to derive private GOS/GMI for the division. Private GOS/GMI for the division is then split by ratios based on the General Government GOS at IOIG level<br><br>Any adjustments made to GOS private during S-U Table balancing are allocated to IOIGs using IOIG proportions when originally compiled. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |
| **Arts and Recreation Services** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions | For the Arts and recreation services division (except Gambling), gross operating surplus/gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level |

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| | based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>For IOIG 9201 Gambling, gross operating surplus (GOS) and gross mixed income (GMI) is taken from 5204.0 (Total Factor Income by industry and principal components - Current prices) at division level. General Government GOS is subtracted from this to derive private GOS/GMI for the division. Private GOS/GMI by IOIG is then calculated from the division total using supply ratios.<br><br>Any adjustments made to GOS/GMI for private non-financial corporations and unincorporated enterprises during S-U Table balancing process are allocated to IOIGs automatically as the SUICs and IOIGs have a one to one relationship. | using historical weights and other observed taxation statistics data. |
| **Other Services** | Data from the EAS are received at ANZSIC class level and then aggregated to IOIG. Data received at the ANZSIC division level (e.g. government data, payment in kind and fringe benefits tax) are disaggregated to IOIG level using proportions based on either general government output or EAS wages data as appropriate. Data are combined at the IOIG level initially and subsequently aggregated to SUIC.<br><br>Any adjustments made during the S-U balancing process are disaggregated to the relevant IOIG based on industry evidence. | For SUIC 940 Repair and Maintenance, gross operating surplus/gross mixed income (GOS/GMI) is derived differently depending on the sector. For the private non-financial corporations sector and unincorporated enterprises GOS/GMI is derived from the EAS data as a residual. GOS for NPISH units and general government units is equivalent to consumption of fixed capital.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for the private non-financial corporations sector during S-U Table balancing process are allocated to IOIGs using IOIG proportions when originally compiled. | Data are compiled at the IOIG level and aggregated to the SUIC level for the S-U tables. Government Finance Statistics data is classified by purpose and tax type which are then mapped to the IOPC level using historical weights and other observed taxation statistics data. |

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| | For SUIC 950 Personal and Other Services, GOS for private non-financial corporations is compiled at SUIC level from EAS and COFC data, and disaggregated to IOIGs using historic weights.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>Any adjustments made to GOS/GMI for private non-financial corporations and unincorporated enterprises during S-U Table balancing process are allocated to IOIGs using IOIG proportions when originally compiled. |
| **Ownership of dwellings** | GOS is derived as a residual at the IOIG level.<br><br>For more detail on the derivation of GOS/GMI refer to tables 11.5 to 11.10.<br><br>This S-U Industry and IOIG have a one to one relationship therefore any adjustments made to GOS during S-U Table balancing process are allocated to the IOIG automatically. |

22.104 Once the disaggregation is completed it is necessary to reconcile (or confront) these results with additional information to ensure the distribution is coherent. The data sources, in addition to the main data sources used to compile the S-U tables, used in this reconciliation process are obtained from the following:

- ABS data:
  - Australian Industry Collection (AIC) case study data;
  - Value of Agricultural Commodities Produced data;
  - Mineral and Petroleum Exploration data;
  - Retail Trade;
  - Quarterly Business Indicators;
  - Building Approvals data;
  - Engineering Construction data;
  - Private Sector Construction data;
  - Water Account data;
  - Motor Vehicle Use data;
  - Tourist Accommodation data;
  - Household Expenditure data;
  - occasional publications;

- Bureau of Resources and Energy Economics;
- Australian Bureau of Agricultural Resource Economics and Sciences:
    - Agricultural Commodities;
    - Australian Forest and Wood Products Statistics;
- Department of Resources, Energy and Tourism:
    - Australian Petroleum Statistics;
- State Departments of Primary Industries;
- Australian Prudential Regulatory Authority;
- Reserve Bank of Australia;
- Australian Taxation Office;
- Medicare statistics;
- annual reports;
- press and internet articles;
- private industry analysis; and
- industry body commentary.

22.105 The level of detail used in the disaggregation and reconciliation processes will vary depending on the component and its data source. The aim is to use the most detailed information where available. For example, detailed information is available at the IOPC level for international trade in goods statistics. However, IOPC level detail is not available for international trade in services or Government Finance Statistics. In this case weights from the previous year's I-O tables are applied to derive I-O estimates.

22.106 The disaggregation (and reconciliation) process will result in imbalances at the I-O levels. These imbalances are resolved during the balancing process described in the steps that follow.

Step 3 Alignment with the ASNA

22.107 The initial data at IOPC level is reviewed against the quality measures (see section on Quality Measures). This initial data quality assessment is designed to ensure that I-O estimates fully aligned with the *Australian System of National Accounts* (cat. no. 5204.0) available at the time that the I-O tables are compiled.

22.108 Given the importance of margins in the I-O framework, detailed ratio analysis are undertaken to review the product allocation of trade margins.

22.109 Adjustments are implemented where required.

Step 4 Industry level analysis

22.110 The I-O tables are assessed against the quality measures via an industry view and adjustments made where necessary. The industry view assesses Australian production of products by each industry and the use of each product by other industries as part of the production process.

Step 5 Row balancing at purchasers' prices

22.111 The supply of each product is balanced against the intermediate and final use of the product by a manual process using the data sources listed in step 2 above.

22.112 A principal edit undertaken in the compilation of I-O tables is to reconcile the flow of products through the productive process. Backward linkages are reconciled to ensure the process of products through the productive process is logical. For example, the Australian production of raw milk is compared to the intermediate use of products produced by the dairy manufacturing industry in milk and dairy product production. As a product is transformed or processed the value of output should increase due to the increase in value added.

22.113 When all of the products are balanced at purchasers' prices (PP) the data are assessed against the quality measures and adjustments made where required.

Step 6 Allocation of margins, taxes and subsidies and derivation of the Basic Price

22.114 Once the I-O tables are manually balanced at purchasers' prices (PP), the use categories at basic prices (BP) are modelled using the basic relationship PP = BP + MTS where MTS represents Margins, Taxes and Subsidies on products.

22.115 The disposition of each margin, tax or subsidy across the use categories is driven by a number of general rules. These rules are applied to all products except those with specific characteristics (see below) in order to ensure the resulting disposition of MTS is logical and coherent. For example, in the use categories, the retail margins can only be allocated to HFCE while wholesale margins can be allocated to all use categories (including intermediate use) except GFCE and inventories.

22.116 In a number of instances the standard disposition of MTS is overwritten by special rules. These special rules are applied to products with specific use characteristics and ensure a better allocation of MTS for these products. An example of a special rule relates to goods consumed by tourists which can attract retail margins in exports.

22.117 Margins, taxes and subsidies are independently allocated across the use categories on a proportional basis according to the general and special rules. The total MTS by product is therefore allocated to all use categories for each product, first using the PP and then on BP once derived.

22.118 The BP is derived from the PP by subtracting MTS in intermediate use and final use. Because MTS are allocated independently, the resulting BP tables are unbalanced. An iterative proportional fitting process is applied to the intermediate use matrix to resolve the imbalances in products and industries. This process iteratively allocates the product imbalances across industries and the column imbalances across products. The final use is not affected by this process.

22.119 The remaining imbalances in the products and industries are used to assess the data quality of the derived BP. The ABS I-O tables are balanced to less than a cent. This is usually achieved by running the proportional iterative process 200 times.

22.120 The different margins, taxes and subsidies are added to the BP in a cumulative manner. For example, in most cases, transport margins will be applied before wholesale margins which will themselves be applied before retail margins. For practical reasons the incremental disposition of MTS is not applied but the basic price is assumed to be a better allocator for MTS. This is particularly true for products attracting a lot of retail margins and for which the inclusion of these margins would distort the disposition of other MTS.

22.121 Once derived, the BP is used to allocate MTS across the use categories. Manual adjustments are made where required. This process is repeated twice in order to gradually refine the disposition of MTS and the resulting BP.

22.122 When all of the products are balanced at BP the data are assessed against the quality measures and adjustments made where required.

Step 7 Produce basic and derived I-O tables

22.123 Basic and derived I-O tables are produced. Another quality check is run to assess data quality and to check publication standards have been applied to the tables for release.

22.124 The SNA68 transport margin adjustment is made (see section on the SNA68 transport margin adjustment for details).

22.125 The alternate view tables are prepared. The treatment applied to compile the alternate view removes the negative effect of the c.i.f./f.o.b. adjustment in imports. (see section on c.i.f./f.o.b. adjustment for details).

22.126 The product details tables are prepared.

22.127 All tables for release are assessed against quality measures and any corrections made as required.

Step 8 Disseminate I-O tables, alternate view tables and product details publication

22.128 Publication tables are disseminated on the ABS website and the last quality check is run to review the publication production cycle and identify and document improvements for the following cycle.

### Quality measures

22.129 Nineteen quality measures are applied at the various steps in the compilation process described above. The quality measures include internal consistency checks and checks for consistency with published national account aggregates. Most of the quality measures are assessed at every gate with a few exceptions. The complete list of quality measures include:

1. Checks that all 3 measures of GDP are equal when aggregated from the I-O tables;
2. Checks that supply matches use in all rows (after product balancing);
3. Checks that applying the SNA68 adjustment for transport margins does not affect PP estimates;
4. A heuristic review of all tables;
5. A check that there is no negative values in supply;
6. Tests that compensation of employees and employers contribution to superannuation are consistent;
7. A check that that the c.i.f./f.o.b adjustment has been applied correctly;
8. Checks that re-exports do not exceed imports;
9. Checks that there are no inventories of services, and no margins attributed to services products;
10. Checks that GST and retail margins are consistent with HFCE;
11. Checks that domestic exports do not exceed production unless stock is drawn from Inventories;
12. Checks that all margins columns sum to zero;
13. Review supply and intermediate use by industry;
14. Checks ANZSIC division growth rates align with estimates published in the National Accounts;
15. Checks that most data items have grown from the previous I-O tables;
16. Check that all issues uncovered in previous tables have been checked;
17. A check that coverage and specialisation ratios are sensible and consistent with previous I-O tables;
18. Review supply and use for consistency for the top 50 products at the IOPC level;
19. Check that the COE/TIU and GOS/TIU ratios are plausible.

## USING I-O TABLES FOR ANALYSIS

22.130 The basic tables and the industry by industry tables are an accounting record of the flows in the economy for a given year. If simplifying assumptions are used, the I-O tables can serve many analytical purposes. For example, it is possible to:

- estimate the levels of output of the production required to meet a given level of final demand;
- the effect of other industries of an additional output of $100m of a product; or
- the impact of an additional exports of a product on other industries, by assuming the average and marginal utilisation rates are the same.

22.131 An impact analysis like this can be concerned with one, several industries in the economy, and can be done using the requirements table.

22.132 Relative prices are constantly changing, and do change significantly from year to year, it is useful to regard I-O tables as representing underlying quantities and technological relationships, rather than values and value relationships. Even factor payments (COE, GOS and GMI) can be viewed as representing quantities of employee services, and of entrepreneurial and capital services. Unless the analyst makes allowance for price changes, all proportions and values will be in terms of relative and absolute prices of the reference year.

22.133 The ABS I-O tables are not revised. They provide a snapshot of the Australian economy at a point in time only and should not be used as time series.

### Direct requirement coefficients

22.134 A simple application of the I-O is calculating inputs as a percentage of the output of an industry, and using these percentages for estimating the input requirements for a given output of the industry. In all tables in the I-O releases, including tables with indirect allocation of imports, 100 always represents total Australian production.

22.135 All coefficients in the requirements matrices relate to flows from industry to industry. The application of the requirements will be in terms of the output of industries and not of the products primary to the industries.

22.136 Direct requirements coefficients have different meanings depending on the treatment of imports in the flow table from which they are derived. If the flow table is based upon direct allocation of competing imports the coefficients in quadrant 1 will only refer to the requirements from domestic production. If the flow tables are based upon an indirect allocation of imports, the coefficients in quadrant 1 will include the use of both imported and domestically produced products. If the usage of a product by an industry remains unchanged, substitution can take place between imports and domestic production without affecting the size of the coefficients.

22.137 The coefficients for COE, GOS and GMI, net taxes on products and other taxes on production are the same regardless of the allocation of imports in the source flow table. However the coefficients for imports depend on the two types of table. In the tables with an indirect allocation of imports, the entries in quadrant 3 (the primary inputs quadrant) relate only to complementary imports (of which none are identified in current I-O tables), and competing imports are included in quadrant 1 since this shows the requirements of any given industry for the output of other industries and competing imports primary to those industries. In tables with a direct allocation of competing imports, the imports entries relate to all imports used by the industry.

### Total requirements coefficients

22.138 The chain of calculations for output requirements can be continued beyond the direct requirements for an industry. For example, in order to produce output from the chemicals industry, inputs are required directly from the mining industry and other industries. To supply this direct requirement, the mining industry itself requires inputs form other industries including the chemicals industry, and so on in a convergent infinite series. In another example, the mining industry may not directly require inputs from agriculture, but requires inputs from chemicals which cannot be produced without inputs from agriculture. Therefore mining has an indirect requirement for input from agriculture. As is the case with the direct requirements coefficients, coefficients in the requirements matrices relate to flows from industry to industry. The application of the requirements will be in terms of the output of industries and not of the products primary to the industries.

22.139 The requirements can be traced, step by step through the industrial structure until the increments of output required indirectly for each industry become insignificant. This occurs after a few rounds. If this is done for all industries, and the direct and indirect requirements are added together, the result is a matrix of total requirements. However, if the number of industries is large the iterative process is too cumbersome, and the matrix is calculated by a process known as matrix inversion. This is why the matrix of total requirements is often referred to as the inverse matrix or Leontief inverse, and its coefficients as inverse coefficients.

22.140 In the total requirements coefficients table, at the intersection of a typical row $i$ and column $j$, represents the units of output of industry $i$ required directly and indirectly to produce 100 units of output absorbed by final demand of industry $j$. The tables are compiled based upon the assumptions of homogeneity and proportionality and this must be taken into account when they are used.

22.141 Derived coefficients will differ according to the way imports have been treated in the flow table from which they are derived. If competing imports were directly allocated in the flow table, the resultant total requirements coefficients in quadrant 1 will only refer to the requirements for domestic production.

Therefore when using of the coefficients it would be necessary to assume unchanged usage of imports or to regulate the coefficients by using revised import usage characteristics.

22.142 If the total requirements coefficients were derived from a flow table using indirect allocation of imports, the coefficients in quadrant 1 will be based on the usage of domestically produced and imported goods. Therefore if the usage of a product by an industry remains unchanged, substitution can take place between domestic products and imports without affecting the size of the coefficients. In using the coefficients an assessment of the proportion of the requirements that is likely to be satisfied by imports would need to be made unless all demand can be met from Australian production.

22.143 All tables of total requirements characteristically have a diagonal entry that exceeds 100. The amounts that exceed 100 are due to the indirect requirements affecting each industry through other industries. This means that to meet 100 units of final demand for the output of an industry, the industry itself has to produce those 100 units, plus any direct or indirect requirements for its output resulting from requirements from itself, or from other industries.

### Specially derived tables

22.144 Instead of being expressed as total output the requirements can be expressed as primary input content. This is based on the assumption that the final output of an industry is equal to the reward paid to the factors of production in all industries contributing directly and indirectly to this final output.

22.145 Each entry in the requirements table represents the total output required from the industry in the row, by the industry in the column for the purpose of producing $100 of output absorbed by final demand. Each of these can also be thought the sum of its inputs, and can be dissected into its individual components. The proportions obtained from the column of the supplying industry in the table of direct coefficients are used. According to the proportionality assumption, the amount of each kind of input used by an industry represents a fixed proportion of the industries output.

### Stability of I-O coefficients

22.146 The use of coefficients in users' analyses will be accurate to the extent that the coefficients remain stable, which is dependent on the extent to which the assumptions of homogeneity and proportionality are valid.

22.147 The homogeneity assumption expresses that: each industry produces a single output (all products are perfect substitutes for one another, or are produced in fixed proportions); each industry has a single input structure (which does not vary in response to product mix); and there is no substitution between products of different groups. This assumption is weakened as product mixes change (with corresponding changes in input mixes), introduction of new products or materials, and as there is substitution between domestic production and imports or vice versa.

22.148 The proportionality assumption says that for any level of output the inputs will be a fixed proportion of the total. This assumption holds in the reference year but less so in each following year. The assumption may be invalidated by economies of scale, technological change, or substitution between the factors of production.

22.149 The I-O tables produced by the ABS represent an open I-O system as the final demand categories are exogenous (i.e. determined outside the system). In a closed system all categories are defined as interdependent which means for example that HFCE is treated like an industry, and its inputs (the requirements of consumers) are part of the solution. The ABS I-O tables are static as they provide a snapshot at a point of time. Dynamic systems introduce explicit time periods into the model and allow the change from a base period to the target to be traced.

### Multipliers

22.150 Multipliers are a tool used by I-O practitioners to answer "what-if?" type questions using the I-O tables, e.g 'what would be the impact on employment of a change in the output of the chemicals manufacturing industry?'. Multipliers can be used to quantify the flow on effect of a change in the output of an industry on one or more of imports, income, employment or output on individual industries, or in total. The multipliers can be used to show "first-round" changes or the aggregate effects once secondary effects have flowed through the system.

22.151 The ABS has published an information paper *Australian National Accounts, Introduction to Input Output Multipliers, 1989-90* (cat. no. 5246.0) which provides a guide to the construction, interpretation and use of I-O multipliers, on the ABS website.

22.152 The ABS frequently receives requests from users who are seeking updated Input-Output (I-O) multipliers. The ABS has not published I-O multipliers since the 1998-99 issue of *Australian National Accounts: Input-Output Tables* (cat. no. 5209.0.55.001) and does not plan to compile and reissue this table. As such, the ABS is unable to support user requests for assistance with multipliers.

22.153 Production of multipliers was discontinued with the 2001-02 issue for several reasons. There was considerable debate in the user community as to their suitability for the purposes to which they were most commonly applied, that is, to produce measures of the size and impact of a particular project to support bids for industry assistance of various forms.

### Limitations of input-output multipliers for economic impact assessment

22.154 I-O multipliers are most commonly used to quantify the economic impacts (both direct and indirect) relating to policies and projects. While their ease of use makes I-O multipliers a popular tool for economic impact analysis, they are based on limiting assumptions that results in multipliers being a biased estimator of the benefits or costs of a project.

22.155 Inherent shortcomings and limitations of multipliers for economic impact analysis include:

- *Lack of supply-side constraints* – the most significant limitation of economic impact analysis using multipliers is the implicit assumption that the economy has no supply-side constraints. That is, it is assumed that extra output can be produced in one area without taking away resources from other activities, thus overstating economic impacts. The actual impact is likely to be dependent on the extent to which the economy is operating at or near capacity.
- *Fixed prices* – constraints on the availability of inputs, such as skilled labour, require prices to act as a rationing device. In assessments using multipliers, where factors of production are assumed to be limitless, this rationing response is assumed not to occur. Prices are assumed to be unaffected by policy and any crowding out effects are not captured.
- *Fixed ratios for intermediate inputs and production* – economic impact analysis using multipliers implicitly assumes that there is a fixed input structure in each industry and fixed ratios for production. As such, impact analysis using multipliers can be seen to describe average effects, not marginal effects. For example, increased demand for a product is assumed to imply an equal increase in production for that product. In reality, however, it may be more efficient to increase imports or divert some exports to local consumption rather than increasing local production by the full amount.
- *No allowance for purchasers' marginal responses to change* – economic impact analysis using multipliers assumes that households consume goods and services in exact proportions to their initial budget shares. For example, the household budget share of some goods might increase as household income increases. This equally applies to industrial consumption of intermediate inputs and factors of production.
- *Absence of budget constraints* – assessments of economic impacts using multipliers that consider consumption induced effects (type two multipliers) implicitly assume that household and government consumption is not subject to budget constraints.
- *Not applicable for small regions* – multipliers that have been calculated from the national I-O tables are not appropriate for use in economic impact analysis of projects in small regions. This is because small region multipliers tend to be smaller than national multipliers since their inter-industry linkages are normally relatively shallow. Inter-industry linkages tend to be shallow in small regions since they usually don't have the capacity to produce the wide range of goods used for inputs and consumption, instead importing a large proportion of these goods from other regions.

22.156 I-O multipliers represent one particular derived or modelled view of I-O data that goes beyond the publishing of the core I-O tables. In light of this, the ABS ceased production of multipliers as an extension of the I-O tables. Instead, users of the I-O tables can compile their own multipliers as they see fit, using their own methods and assumptions to suit their own needs from the data supplied in the main I-O tables.

22.157 While I-O multipliers may be useful as summary statistics to assist in understanding the degree to which an industry is integrated into the economy, their inherent shortcomings make them inappropriate for economic impact analysis. These shortcomings mean that I-O multipliers are likely to significantly overstate the impacts of projects or events. More complex methodologies, such as those inherent in Computable General Equilibrium (CGE) models, are required to overcome these shortcomings.

## Types of Analysis

22.158 I-O tables are a powerful analytical tool. They can be used in many ways including;

- analysis of production, structure of demand, export ratios, employment, prices and costs, imports required, investment and capital, and exports;
- analysis of energy and of environment; and
- sensitivity analysis.

22.159 The basic role of I-O analysis is to analyse the link between final demand and industrial output levels. The total requirements coefficient in the ASNA context could be used to assess the effects on a productive system of a given level of final demand. Employment implications are equally important in this respect. I-O tables can also be used for analysing changes in prices stemming from changes in costs, or taxes and subsidies. The determination of the level of imports is often a vital part of the I-O exercise, particularly where the balance of payments imposes a constraint on economic policies. There are questions of direct demand for imports, and secondly, of indirect demand for imported inputs from all industries involved directly or indirectly. The I-O framework might also be extended to cover demands for fixed assets, by relating the investment table to output. One of the standard I-O applications is the analysis between exports and the necessary direct and indirect inputs, some of which may be imported.

22.160 There has been an increased use in I-O analysis recently for more structural analysis, including in the energy, and environment fields. It is possible to calculate the energy content of the different products in intermediate and final demand, and the indirect energy needs from energy matrices, either in value of volume terms. The I-O approach is an essential component in environmental analysis as it enables the direct and indirect sources of pollution by linking data on emissions in physical terms to the I-O tables. The pollution content of the components of final demand can then be calculated. I-O tables with environmental related extensions are a major component of the basic framework of the satellite accounting of the environment.

22.161 The derivation of industry estimates of changes in multifactor productivity requires coherent current price and volume estimates of output, intermediate inputs, capital services and labour input. S-U tables at current prices and in the prices of the previous year, with consistent measures of labour input can provide most of the data required. The major exception is capital services. While the estimates of capital formation from the S-U tables do not provide the required measure of capital service, they are a major element in its estimation.

22.162 The I-O tables can also be used for various kinds of sensitivity analysis. These analyses reveal the effects if some variables in the output model are changed. Increased attention has recently been shown to dynamic I-O models. The essential distinction of a dynamic model is that it traces the path of the economy from a particular year to a target year, and it may be applied to calculate the requirements of a given final output, not only in the current year but through direct and indirect capital requirements in all preceding years. Dynamic models look at the future growth path of the economy year by year. These include Computable General Equilibrium (CGE) models. CGE models are used extensively to inform government policy analysis in many areas such as development economics, fiscal policy, international trade policy and micro economic reform. The national I-O tables provide a basis from which the compilation of state and regional tables can be modelled.

# CHAPTER 23 SATELLITE ACCOUNTS

## INTRODUCTION

23.1 A great strength of the SNA (and ASNA) framework is that its articulation allows a great deal of flexibility in its implementation while still remaining integrated, economically complete and internally consistent. A classic example of its flexibility is the development of satellite accounts where an account is linked to, but distinct from, the central system. Satellite accounts allow an expansion of the national accounts for selected areas of interest while maintaining the concepts and structures of the core national accounts.

23.2 There are two types of satellite accounts serving two different functions, namely those that involve:

1. elaboration or extension of detail; and
2. alternative concepts and classifications.

23.3 The first type involve some rearrangement of the classifications and the possible introduction of complementary elements but they do not change the underlying concepts of the SNA. The main reason for developing such a satellite account is that to encompass all the details for all areas of interest as part of the standard system would overburden it and possibly distract attention from the main features of the accounts. Examples include environmental protection expenditure and information, communication and technology satellite accounts.

23.4 The second type are mainly based on concepts that are alternatives to the SNA. These include a different production boundary, an enlarged concept of consumption or capital formation, an extension of the scope of assets, etc. This type may also involve changes in classifications but the main emphasis is on the alternative concepts. It is a particularly useful way to explore new areas in a research context, i.e. they allow experimentation with new concepts and methodologies with a wider degree of freedom that is possible within the central system. An example may be the role of volunteer labour in the economy as well as the tourism satellite account.

23.5 Some sets of satellite accounts may include features of both types of satellite accounts.

23.6 The ABS has been producing satellite accounts since 2000. The first was a tourism satellite account released in 2000 in relation to 1997-98 and this has been published annually in the ABS publication *Australian National Accounts: Tourism Satellite Account* (cat. no. 5249.0). In 2002 a non-profit institutions satellite account was published in relation to 1999-00 and subsequently in 2009 the account for 2006-07 was released in the ABS publication *Australian National Accounts: Non-Profit Institutions Satellite Account* (cat. no. 5256.0). An information and communication technology satellite account was published in *Australian National Accounts: Information and Communication Technology Satellite Account, 2002-03* (cat. no. 5259.0) in 2006.

23.7 The ABS has maintain an environmental statistical program for some time, though the extent of published environmental accounts has been limited until recently. Natural resource management and water use relating to agriculture has been well served, but significant statistical gaps existed in water more generally, as well as energy-related environmental aspects, waste, non-agricultural resource management, and the production and use of environmental goods and services. Over recent years, the ABS has produced accounts for water, energy and environmental protection expenditure and is intending to expand this to include land, waste and an environment industry account.

23.8 The ABS has produced three papers to provide measures of unpaid work which is outside the production boundary as defined in the 2008 SNA but does constitute production in a broad sense. The latest publication is *Unpaid Work and the Australian Economy, 1997* (cat. no. 5240.0). The ABS has not produced a household satellite account as such to date. A number of conceptual and methodological (given there is no agreed standard for a household satellite account) and funding issues would need to be resolved prior to its production.

23.9 The rest of this chapter outlines the general approach the ABS has taken to produce the tourism, non-profit institutions and information and communication technology satellite accounts as well as the environment-related accounts. Also included is a discussion on the issues surrounding the production of a household satellite account including an outline of the approach used to measure unpaid work. The ABS has a program of future work associated with satellite accounts and environmental-economic accounting.

## TOURISM SATELLITE ACCOUNT

23.10 The Australian tourism satellite account (ATSA) is based on the international standard *Tourism Satellite Accounts: Recommended Methodological Framework 2008* (TSA RMF)(Eurostat, the OECD, the UN Statistical Division and the UN World Tourism Organisation) which is an update of the first version published in 2000. Along with other statistical agencies, the ABS contributed to the TSA RMF development and helped ensure consistency with the 2008 SNA.

23.11 The TSA provides a means by which the economic aspects of tourism can be drawn out and analysed separately, however still within the structure of the ASNA. The ATSA is set in the context of the whole economy so that tourism's contribution to major national accounting aggregates can be determined and compared with other industries.

23.12 The key aggregates of the TSA are:

- tourism consumption;
- direct tourism output;
- direct tourism gross value added (GVA);
- direct tourism gross domestic product (GDP); and
- direct tourism employment.

### Scope of the TSA

23.13 The ATSA measures the direct impacts of tourism only. Indirect impacts are outside the scope of the ATSA, however they are measured by Tourism Research Australia, using the tourism supply and use table and input-output mulitpliers.

23.14 A direct impact occurs where there is a direct relationship (physical and economic) between a visitor and a producer of a good or service.

23.15 Alternatively the indirect effect of tourism consumption is a broader notion that includes downstream impacts of tourism demand. For example, when a visitor buys a meal, indirect effects are generated for the food manufacturer, the transporter, the electricity distributor, etc., all of which provide the necessary inputs required to make the meal.

23.16 In the case of goods purchased by visitors, only the retail margin contributes to key tourism supply measures. This is because it is deemed that only the retailer has a direct relationship with the visitor and is therefore part of the tourism industry. The implication of this treatment is that the value added generated in the chain of supply of goods to visitors up to, but not including, the retail level will be treated as an 'indirect effect' of tourism consumption, while only the value added generated from retail trade activities provided to visitors will be considered as a direct effect.

## Concepts of tourism

### Tourism

23.17 An important conceptual distinction concerns the difference between travel and tourism, and consequently between a traveller and a visitor. The term 'tourism' in the international standards is not restricted to leisure activity. It also includes travel for business or other reasons, such as education, provided the destination is outside the person's usual environment. A person's 'usual environment' is defined by the *2008 International Recommendations for Tourism Statistics* (IRTS) as

> *'the geographical area (though not necessarily a contiguous one) within which an individual conducts his/her regular life routines.'*[61]

23.18 Travel is a broad concept which encompasses the activity of travellers and includes commuting to a place of work, migration and travel for business or leisure. A traveller is defined by the 2008 IRTS as:

> *'..someone who moves between different geographic locations, for any purpose and any duration.'*[62]

### Visitors

23.19 The central statistical entity in tourism statistics is the 'visitor'. The scope of tourism in the international standards comprises the activity of visitors. A visitor is defined in the 2008 IRTS as:

> *'...a traveller taking a trip to a main destination outside his/her usual environment, for less than a year, for any main purpose (business, leisure or other personal purpose) other than to be employed by a resident entity in the country or place visited.'*[63]

23.20 If a person stays in the one place for longer than one year, their centre of economic and social interest is deemed to be in that place, so they no longer qualify as a visitor.

23.21 The following types of persons are not considered to be visitors:

- persons for whom travel is an intrinsic part of their job, e.g., bus driver, air crew;
- persons who travel for the purpose of being admitted to or detained in a residential facility such as a hospital, prison or long stay care;
- persons who are travelling as part of a move to a new permanent residence;
- persons who are undertaking military duties; and
- persons who are travelling between two parts of their usual environment.

23.22 Visitors can be classified into national and international visitors. National or 'domestic' visitors consist of Australian residents who travel outside their usual environment within Australia. They include both overnight visitors, people that travel more than 40kms from home (staying one or more nights at a location) and same day visitors, people who travel over 50kms in a round trip, outside of their usual environment. International visitors are those persons who travel to a country other than that in which they have their usual residence.

23.23 The one year rule for length of stay for an international visitor is consistent with the principle applied in determining residency which requires the length of stay in an economic territory to be less than one year to qualify as a non-resident. The ATSA includes as visitors all international students undertaking short term courses with an actual length of stay of less than one year. If a student stays longer than one year (ignoring short-term interruptions to their stay, for example at vacation break), their usual environment is deemed to be the school or university, and they do not fit the definition of a visitor. However, if they travel outside their usual environment, they are considered a visitor.

23.24 For the purposes of measuring direct tourism gross value added and direct tourism GDP in the ATSA, the consumption of Australian residents travelling overseas (outbound visitors) is excluded, except to the extent they consume domestically produced products before or after their overseas trip. This is because their

[61] United Nations Statistical Commission (UNSC), *2008 International Recommendations on Tourism Statistics*, United Nations, New York, Feb 2008, paragraphs 2.21 – 2.25

[62] UNSC, paragraph 2.4

[63] UNSC, paragraph 2.9

consumption overseas does not relate to the value of goods and services produced within the Australian economy.

### Tourism expenditure

23.25 Tourism expenditure covers actual expenditure by the visitor, or on behalf of the visitor, and is defined in the 2008 IRTS as:

> *'...the amount paid for the acquisition of consumption goods and services, as well as valuables, for own use or to give away, for and during tourism trips. It includes expenditures by visitors themselves, as well as expenses that are paid for or reimbursed by others.*[64]

23.26 As per the above definition, tourism expenditure also includes expenditure by visitors whose main purpose is business, even if this is totally or partly paid for by their employer. It also accounts for expenditure before or after the trip that related to the trip e.g. purchase of luggage or printing of photographs.

23.27 Some expenditure by Australians travelling abroad is also included in tourism expenditure. The purchase of these goods and services must be before or after the trip in Australian domestic territory. With the exception of inbound services provided by Australian international air carriers, anything that is purchased by an Australian whilst overseas is considered an import of a good or service.

### Tourism consumption

23.28 Tourism consumption includes consumption by both domestic and international visitors.

23.29 It also includes imputations for consumption by visitors of certain services for which they do not make a payment. Imputed consumption in the ATSA includes:

- services provided by one household to the visiting members of another household free of charge, including the value of goods such as food and purchased services provided by host family/friends;
- housing services provided by vacation homes on own account (imputed services of holiday homes deemed to be consumed by their visitor owners); and
- imputed values of non-market services provided directly to visitors such as public museums even though these may be provided free or at a price which is not economically significant.

### Direct tourism GVA and direct tourism GDP

23.30 Direct tourism GVA and direct tourism GDP are the major economic aggregates derived in the ATSA.

23.31 Direct tourism GVA is measured as the value of the output of tourism products by industries in a direct relationship with visitors less the value of the inputs used in producing those tourism products. Output is measured at 'basic prices', that is before any taxes on tourism products are added (or any subsidies on tourism products are deducted). Taxes on tourism products include the GST, wholesale sales taxes and excise duties on goods supplied to visitors. Direct tourism gross value added is directly comparable with estimates of the gross value added of 'conventional' industries such as mining and manufacturing that are presented in the national accounts.

[64] UNSC, paragraph 4.2

23.32 Direct tourism GDP measures the value added of the tourism industry at purchasers' prices. It therefore includes taxes paid less subsidies associated with the productive activity attributable to tourism and will generally have a higher value than direct tourism value added. Direct tourism GDP is a satellite account construct to enable a direct comparison with the most widely recognised national accounting aggregate, GDP.

23.33 While direct tourism GDP is useful in this context, the direct tourism GVA measure should be used when making comparisons with other industries or between countries.

## Classifications

23.34 Not all products and industries in the standard national accounts product and industry classifications are related to tourism. Therefore, the TSA distinguishes between products and industries that are related to tourism, and those which are not. Tourism related products and industries are further classified into tourism characteristic and tourism connected resulting in three categories of industry and product in the ATSA.

### Tourism related products

23.35 Tourism characteristic products are defined as those products which would cease to exist in meaningful quantity, or for which sales would be significantly reduced, in the absence of tourism. Under the international TSA standards, core lists of tourism characteristic products, based on the significance of their link to tourism in the worldwide context, are recommended for implementation to facilitate international comparison. International TSA standards also recommend that country-specific tourism characteristic products are identified. In the ATSA, for a product to be a country-specific tourism characteristic product, at least 25 per cent of the total output of the product must be consumed by visitors.

23.36 Tourism connected products are those products that are consumed by visitors but are not considered as tourism characteristic products. These products are not typical to the tourism industry only.

23.37 All other products in the supply and use table not consumed by visitors are classified as 'all other goods and services' in the ATSA.

### Tourism related industries

23.38 Tourism characteristic industries are defined as those industries that would either cease to exist in their present form, or would be significantly affected if tourism were to cease. Under the international TSA standards, core lists of tourism characteristic industries, based on the significance of their link to tourism in the worldwide context, are recommended for implementation to facilitate international comparison.

23.39 In the ATSA, for an industry to be a country-specific tourism characteristic industry, at least 25 per cent of its output must be consumed by visitors. Whether or not an industry is classified as characteristic has no effect on total value added resulting from tourism. This is because the ATSA measures the gross value added resulting from the production of products directly consumed by visitors, not the total gross value added generated by tourism related industries.

23.40 Tourism connected industries are those, other than tourism characteristic industries, for which a tourism related product is directly identifiable (primary) to it, and where the products are consumed by visitors in volumes which are significant for the visitor and/or the producer.

23.41 Industries that do not fall into characteristic or connected industries are classified as 'all other industries', though some of their products may be consumed by visitors and are included in the calculation of direct tourism gross value added and direct tourism GDP.

## Tourism satellite account framework

23.42 The supply and use tables for the Australian economy provide the framework in which data for visitor expenditure (demand) and industry output (supply) are integrated and made consistent in the ATSA benchmark process. Moreover, they provide the means of calculating direct tourism gross value added and direct tourism GDP.

23.43 The 'supply' table is a matrix showing (in the rows) the basic price values of products produced by each major industry. It also shows the supply of products from imports, and the net taxes on products and trade and transport margins that are required to derive supply at purchasers' prices. The 'use' table shows the use of each product, both as intermediate consumption by industries and in domestic final demand and exports. The use table also shows the primary inputs (compensation of employees and gross operating surplus) required by each industry.

23.44 The supply and use tables are brought to balance so that the supply of each product equals its use. As the objective of the ATSA is to focus on tourism related products and the industries that produce them, some disaggregation of the products and industries shown in the standard tables is required. It is therefore necessary to augment the standard supply and use tables to accommodate for this. For operational convenience in constructing the ATSA, the non-tourism products and industries are compressed, but the details still remain in the underlying supply and use tables.

23.45 An important characteristic of tourism products is that they are not uniquely defined by their nature, but by who purchases them. Therefore, the consumption of each product has to be divided into the part consumed by visitors and the part consumed by non-visitors. This information is used to partition industries into their tourism and non-tourism components, enabling the derivation of direct tourism value added and direct tourism GDP.

23.46 An important part of the compilation process is to check the consistency of data for visitor expenditures on products with the total supply of products. Apparent inconsistencies are resolved by further data investigations and adjustment.

## Sources and methods

23.47 The data sources and methods used to compile the Australian TSA are outlined in detail in the ABS publication *Australian National Accounts: Tourism Satellite Account* (cat. no. 5249.0).

23.48 The TSA methodology involved estimating a full benchmark every third year. The method for compiling benchmark estimates involves the use of fully balanced supply and use tables that underlie the ASNA. Further, the latest industry data in respect of tourism related industries is incorporated. In order for tourism output and value added to be derived, the satellite accounts need to be supplemented with data from the demand side, i.e. tourism consumption.

23.49 A number of steps are required to then compile direct tourism value added. These are detailed in the 5249.0 publication. Very simply after removing product taxes and subsidies, margins and imports from internal tourism consumption (for each tourism product), it is possible to derive tourism product ratios to determine the output of each product consumed by tourists. Tourism intermediate consumption is then derived using relationships from the supply-use tables. Direct tourism gross value added is then estimated as direct tourism output less intermediate consumption required to produce this output, and sum for all industries in the economy,

23.50 It is not feasible to collect the detailed supply side data required to produce a timely full scale TSA every year. Therefore the key aggregates are updated annually using relationships in the benchmark TSA and demand side data that are available annually.

23.51 Where there is a structural change in tourism related industries or the general economy in the non-benchmark years, it is likely that there will be revisions when the next benchmark is compiled.

23.52 The main data sources are from:

- from Tourism Research Australia – the National Visitor Survey and the International Visitor Survey; and
- from ABS – the Census of Population and Housing, the Household Expenditure Survey, the Balance of Payments and International Investment Position, the Economic Activity Survey, the Labour Force Survey and Overseas Arrivals and Departures.

23.53 In a benchmark year additional data sources are used. These can be found in the *Australian National Accounts: Tourism Satellite Accounts 1997-98* (cat. no 5249.0).

NON-PROFIT INSTITUTION SATELLITE ACCOUNT

23.54 A non-profit institutions satellite account highlights non-profit institutions (NPIs) within the national accounting framework. The concepts and methods used in the Australian NPI satellite account are based on *The Handbook on Non-profit Institutions in the System of National Accounts* (the *Handbook*). The *Handbook* was endorsed by the United Nations Statistical Commission in 2002.

23.55 An NPI satellite account provides a means by which the economic aspects of NPIs can be drawn out and analysed separately within the structure of the main accounts. One of the major features of an NPI satellite account is that it is set within the context of the whole economy, so that NPIs contribution to major national accounting aggregates can be determined.

23.56 The NPI satellite account has two dimensions. The first is referred to as measurement on a national accounts basis. This is equivalent to production and other economic aggregates as defined in the national accounts. Therefore the estimation of output is based on whether the NPI is a market producer or a non-market producer in accordance with the ASNA. Consequently NPI gross value added and NPI GDP is also consistent with the ASNA.

23.57 The second dimension is referred to as measurement on an NPI satellite account basis. This dimension extends the boundary of national accounts to include values for the non-market output of market producers and NPI services provided by volunteers. Measurement on an NPI satellite account basis provides a more complete picture of the value of NPIs to society than is evident in estimates included in the national accounts.

Non-market output of market producers

23.58 The non-market output of market producers measures that component of the output of market NPIs which is not captured when output of market units is valued under the standard SNA convention of valuation by sales. The *Handbook* argues that if such an adjustment is not made to value any non-market output produced by market units, then the value of the output of market NPIs is understated as such units can produce significant amounts of output which are supported by charitable contributions or other transfers that is not evident in sales revenue.

23.59 The non-market output of market producers is valued as the difference between the output of market units when calculated by the standard SNA valuation method for non-market units of cost summation, and output as calculated by the standard SNA method for market units of valuation by sales. Where output on a cost valuation basis exceeds output on a sales valuation basis, the difference is taken to be the non-market output of market producers. Where output on a sales basis exceeds output on a cost basis, non-market output of market producers is assumed to equal zero.

Volunteer services

23.60 The *Handbook* recognises that as volunteer labour is critical to the output of NPIs and their ability to produce a level and quality of service, it is important to capture and value this activity in the NPI satellite account. The *Handbook* proposes three methods by which volunteer services can be valued. Each method involves assigning a wage rate to the total number of hours worked by volunteers.

23.61 The first such valuation method mentioned in the *Handbook* is referred to as the "opportunity cost" approach. The notion behind this approach is that each hour of volunteer time should be valued at what the time is worth to the volunteer in some alternative pursuit. The applicable wage rate at which an hour of volunteer time is valued in this instance is therefore the wage rate associated with the usual occupation of the volunteer. The *Handbook* recognises that while theoretically desirable for some analytical purposes, this valuation approach is not often used. The ABS has considerable reservations as to the appropriateness of this valuation method, as it assumes that paid work is foregone in order to undertake voluntary work. Most workers, however, have limited choices in the hours they work and are more likely to be giving up leisure time for voluntary work. This being the case, the opportunity cost should not be based on the wage they receive in the market but on the value they place on leisure. Valuation of goods and services at market prices is fundamental to national accounting. In this context, two volunteers involved in identical unpaid activity should be valued at the same hourly rate irrespective of what they could each earn in their paid occupations. Additionally, this method raises the issue as to which is the appropriate wage rate to apply to those volunteers who do not have a usual occupation, for example those who are retired or unemployed or otherwise not in the labour force.

23.62 The second valuation method proposed in the *Handbook* is the "replacement cost" or "market cost" approach. This approach recommends that each hour of volunteer time be valued at what it would cost the organisation to replace the volunteer with paid labour. The applicable wage rate at which an hour of volunteer time is valued in this instance relates to the particular activity being undertaken by the volunteer. While this method is preferred over the opportunity cost approach, the value of volunteer services may be under or over-estimated using this approach depending on variations in the productivity of volunteers compared with labour provided to the market sector. The estimate of volunteer services included in this satellite account is based on this approach.

23.63 The *Handbook* recognises that both the opportunity and replacement cost methods require more information on the activities in which volunteers engage than is likely to be available in most countries. Where detailed data on volunteering are not available, the *Handbook* recommends a fall-back option which values each hour of volunteer time at the average gross wage for the community, welfare and social service occupation category. The *Handbook* argues that the work of volunteers is most likely to resemble this occupation category, and that the associated wage rate is conservative and typically towards the low end of the income scale but not at the very bottom.

### Classifications

23.64 The classification system used in the Australian NPI satellite account is a reduced version of the classification that is recommended in the *Handbook*, the International Classification of Nonprofit Organisations (ICNPO). Although ICNPO does include some purpose criteria, it is fundamentally an activity classification. ICNPO permits a fuller specification of the components of the non-profit sector than the ANZSIC. In some instances the detailed ANZSIC codes cut across several ICNPO groups and sub groups. In keeping with the current availability of data, a number of the broad level ICNPO groups have been combined and estimates are not produced for classifications below the group level. A full version of ICNPO and the concordance between ICNPO and the ANZSIC classification are shown as part of the satellite account publication.

23.65 Data on voluntary work was collected using an activity classification which is similar to ICNPO, at least at the group level. A concordance between ICNPO and the type of organisation for which volunteers worked is also available.

### Scope of the NPI satellite account

23.66 The Australian NPI satellite account does not attempt to measure the universe of entities that could be defined as NPIs. This is partly for practical and partly for conceptual reasons.

23.67 The *Handbook* defines non-profit organisations in paragraphs 2.15 to 2.19 as organisations which are:

- not-for-profit and non-profit-distributing;
- institutionally separate from government;
- self-governing; and
- non-compulsory.

23.68 This definition forms the basis of what is included within the scope of the NPI satellite account.

#### Organisational existence

23.69 Organisational existence means that in order to meet the definition of an NPI, an entity must have some institutional reality and a meaningful organisational boundary separate and distinct from its members.

23.70 For the purposes of the satellite account, a practical means to identify that an entity meets this criterion is the existence of an ABN. Without an ABN, an entity cannot have employees or accept tax deductible donations. There are many non-profit groups in Australia who do not have an ABN, some of which if examined closely could be argued to have a separate organisational existence. However, if such groups are unable to employ or accept tax deductible donations then the economic significance of such units is likely to be negligible.

### Not-for-profit and non-profit distributing

23.71 In order to meet the definition of an NPI, an entity must be both not-for-profit and non-profit-distributing. This means that the organisation does not exist primarily to make a profit, and any surplus it accumulates must not be distributed to owners or members.

23.72 For the purposes of the satellite account, this means that units are excluded from the scope of the account if they are able to distribute surpluses to members, either on an ongoing basis or on liquidation. The *Handbook* mentions that to the extent that they are able to distribute profits to members, co-operatives and mutual societies are excluded from the NPI sector. Also excluded from the satellite account on this basis are strata titles, credit unions and building societies and any other units classified to either the finance or insurance industries such as religious charitable development funds.

### Institutionally separate from government

23.73 In order to meet the definition of an NPI, an entity must be institutionally separate from government. This means that the organisation must have sufficient discretion with regard to both its production and use of funds, and that its operating and financing activities cannot be fully integrated with government finances.

23.74 For the purposes of the satellite account, this means that any unit classified to the general government sector is excluded on the basis that if the unit is sufficiently controlled by government to be included in the general government sector, its finances are integrated with those of the government and the unit is not sufficiently separate from government to satisfy this criterion.

### Self-governing

23.75 In order to meet the definition of an NPI, an organisation must be self-governing. This means that the organisation must be able to control its own activities and is not under the effective control of any other entity.

### Non-compulsory

23.76 In order to meet the definition of an NPI, an organisation must be non-compulsory. This means that membership or contributions of time and money cannot be required or enforced by law or otherwise made a condition of citizenship. However, a unit is still considered an NPI if membership is a necessary condition in order to practice a particular profession. For the purposes of the satellite account, this means that professional associations are within scope.

## Sources and methods

23.77 The NPI satellite account has been compiled from a variety of data sources, including ABS economic and social collections. The sources used to compile the various data contained in the satellite account are outlined below.

### Monetary aggregates

23.78 The bulk of the data contained in the NPI satellite account are monetary aggregates. This includes data about income, use of income, capital expenditure and asset stocks, as well as the national accounting measures of output of goods and services and gross value added.

23.79 The data used to compile this information were taken from the ABS publication *Not-for-profit Organisations Australia, 2006-07* (cat. no. 8106.0). This publication presents the results of a survey of all employing and significant non-employing non-profit organisations which collected a range of information from a sample of these organisations, including detailed information about their financial performance over the reporting period.

23.80 Micro non-employing non-profit organisations with turnover below a set threshold were excluded from the scope of *Not-for-profit Organisations Australia, 2006-07*. Information for these organisations was therefore taken from Business Activity Statement (BAS) data as collected by the Australian Taxation Office.

### Employment and volunteers

23.81 Data in respect of permanent full time, permanent part time and casual paid employees of NPIs were taken from *Not-for-profit Organisations Australia, 2006-07*.

23.82 *Not-for-profit Organisations Australia, 2006-07* collected information as to the number of volunteers that each organisation surveyed reported had worked for their organisation during the reporting period. However, more detailed information on volunteering is available from the ABS publication *Voluntary Work, Australia 2006* (Cat. no. 4441.0). The estimates presented in the *Voluntary Work, Australia 2006* publication are based on a household survey which collected detailed information about the activities undertaken by volunteers and their personal characteristics. It was considered that the data on the number of volunteers contained in the *Voluntary Work Australia, 2006* publication provided a more complete analysis of volunteer activity and was used in the satellite account.

### Volunteer services

23.83 The compilation of data about the value of volunteer services involved taking information on the annual hours volunteered from the *Voluntary Work Australia, 2006* publication and assigning a wage rate to each of those hours. Information on wages and average weekly hours worked was taken from the ABS publication *Employee Earnings and Hours Australia, May 2006* (Cat. no. 6306.0).

23.84 As detailed in the discussion contained in the conceptual framework, the *Handbook* recommends three alternative methods for estimating the value of volunteer services. The compilation of each of these methods and the different results generated are outlined the ABS publication *Australian National Accounts: Non-Profit Institutions Satellite Account* (cat. no. 5256.0).

## INFORMATION AND COMMUNICATION TECHNOLOGY SATELLITE ACCOUNT

23.85 The Information and Communication Technology (ICT) satellite account developed by the ABS used the national accounts framework to present a picture of the value of transactions in ICT products within the Australian economy. One role of this satellite account was to review and, where necessary, make improvements to ICT data series used in the ASNA itself.

23.86 Satellite accounts such as tourism and non-profit institutions use a set of recommended classifications and frameworks developed from international research and discussion over a number of years, with international agencies usually taking the lead. There were no such guidelines available for an ICT satellite account, although there has been international initiatives on some aspects important to this work.

### Framework for the ICT satellite account

23.87 The basic compilation framework for the ICT satellite account was the national accounts 'supply and use' system. It was adapted to focus on ICT products and the industries producing or distributing those products. Fundamentally, the system consisted of a supply table that tracked the supply of ICT products from imports and from Australian producers, and a use table that tracked the use of those products by industries, government, households and for export.

### Concepts for the ICT satellite account

23.88 The concepts for the ICT satellite account were consistent with the ASNA and are outlined below.

#### ICT output

23.89 The value of ICT output was the market value of ICT goods and services produced within Australia. ICT output may be produced by units in any industry, though in practice the great majority of ICT output was produced by a small number of industries.

23.90 Capital goods produced on own account for own use were valued according to their estimated market value, or if this was not possible, on the basis of production costs, i.e. the value of labour and non-labour costs, and consumption of fixed capital used to produce the capital good. There are two significant ICT-related items of capital work produced on own account - own account computer software and own account production of telecommunication assets. The latter item relates wholly to telecommunication service providers and comprises the physical infrastructure required to put various telecommunication equipment in place (e.g. construction of mobile phone towers). All industries engage in producing computer software on own account.

#### ICT gross value added and ICT GDP

23.91 ICT gross value added at basic prices was measured as the value of output of ICT goods and services less the value of intermediate consumption inputs used in producing these ICT products. ICT gross value added is comparable with estimates of the gross value added of 'conventional' industries such as mining and manufacturing as presented in the ASNA.

23.92 ICT GDP, on the other hand, measured the gross value added of the ICT industry at purchasers' prices. It therefore included taxes (less subsidies) on ICT related products. ICT GDP has a higher value than ICT gross value added.

23.93 ICT GDP was a construct to allow comparison with the most widely recognised national accounting aggregate, GDP. While it is useful in this context, the ICT gross value added measure should be used in comparisons with other industries and between countries. There is no generally accepted way to allocate deductible taxes such as GST to industry, and substantially different results can be obtained for industry GDP depending on the method chosen. This is a further reason for gross value added to be the preferred measure for industry comparisons.

### ICT investment

23.94 ICT investment was gross fixed capital formation plus changes in inventories relating to ICT products. Gross fixed capital formation is the value of acquisitions less disposals of new or existing fixed assets. Assets consist of tangible or intangible assets that have come into existence from processes of production, and that are themselves used repeatedly or continuously in other processes of production over periods of time exceeding one year.

### ICT Government final consumption expenditure

23.95 Government final consumption expenditure is current expenditure by general government bodies on services to the community such as defence, public order and safety. Because these are provided free of charge or at prices which cover only a small proportion of costs, the government is considered to be the consumer of its own output. This output has no directly observable market value, and so is valued in the national accounts at its cost of production. In 2002-03, general government bodies in Australia did not produce any market output that could be considered ICT in nature and therefore government final consumption expenditure on ICT products was estimated as zero.

23.96 Current expenditure by general government bodies on such things as telecommunication services and computer services was treated as intermediate consumption by these units.

## Scope and classifications

23.97 The scope of the ICT satellite account is effectively determined by the range of products (goods and services) defined as 'ICT'. At the time the satellite account was published the Working Party on Indicators for the Information Society convened by the OECD has produced a draft 'Classification of ICT Goods' and was working on a classification of ICT services. The ABS had significant input into this work and the classification used by the ABS in ICT Industry Survey (ICTIS) 2002-03 was broadly consistent with, but not identical to the OECD classification as far as it relates to goods. The OECD definition included a broader range of goods than the Australian definition. The Australian definition only included ICT goods if they were able to be networked or were components of goods that could be networked. It also excluded a range of medical, scientific and audio visual equipment.

23.98 The scope of 'ICT industries' relates closely to the set of ICT products defined above. ICTIS 2002-03 was a major data source for the satellite account and covered the main industries involved in the production and distribution of ICT goods in Australia. Its scope was broadly consistent but not identical with the OECD ICT Sector definition. The Australian definition only included ICT products if they were able to be networked or were components of products that could be networked. Units that manufactured or distributed products such as industrial process equipment were included in the OECD classification but excluded from the ABS classification.

23.99 Within the 'ICTIS industries', businesses were further classified as either ICT specialists or non-specialists. Businesses in these industries were defined as ICT specialists if more than 50 percent of their income was derived from production of ICT outputs.

### Economy-wide ICT industry

23.100 An alternative view was to group all similar activities together as an 'industry', regardless of whether the ICT products were produced as primary activities of businesses that were commonly thought of ICT producers, or as secondary activities of businesses that were not regarded as ICT producers. For example, ICT products such as software produced as a secondary activity by businesses (and government organisations) outside the ICT industries would be included. Likewise, non-ICT products produced by ICT specialist industries would be excluded. This leads to a wider definition of the 'ICT industry'. The disadvantage of this view is that estimates of ICT gross value added on this basis require use of assumptions because it is not possible to collect all the required information on the costs of producing ICT products or the value of output.

23.101 This wider activity concept of an ICT 'industry' is clearer in practice where it involves actual sales of ICT products. Defining the boundary becomes more complicated where ICT goods and services are produced in-house for own use. For example, a bank (classified to the financial services industry) may use its own employees to provide help desk services, data processing, system maintenance and software development, etc., or it may purchase these services from other businesses. Where these services are purchased, and

regardless of the source of the purchase, they become part of the economy-wide ICT industry for inclusion in the satellite account. In the national accounts, goods and services produced for own use are not regarded as part of output where they are consumed as part of the process of producing other goods and services. In that case their value is reflected in the other outputs of the business, in this example financial services. However, where the in-house ICT products are in the nature of gross fixed capital formation, for example software development, they are included as products in their own right in the national accounts.

23.102 In principle, the scope of the ICT satellite account could conceivably be defined to include all ICT activity including in-house activity. Using the above example of a bank, help desk activities could be separately valued and included as part of ICT output and value added. The services would be deemed as being both 'sold' and then 'purchased' by the bank for input to the production of financial services. However, this quickly becomes an artificial construct. Businesses make different decisions about which functions to outsource and which to provide in-house across a whole range of activities, including accounting, payroll, transport, storage, recruitment and so on. In practice, it is not possible to collect the information required or to satisfactorily value such activities provided in-house.

23.103 An 'economy-wide' scope was adopted in the satellite account. However, ICT products produced in-house for own use were excluded from the output and use of ICT products, apart from in-house production of ICT capital goods (software and telecommunication assets).

## Sources and methods

23.104 The ICT satellite account data was sourced primarily from ABS collections, namely:

- ICT Industry Survey (ICTIS);
- Economic Activity Survey;
- Balance of Payments and Trade;
- Government Technology Survey;
- Household Use of IT Survey;
- Business Use of IT Survey;
- Internet Activity Survey;
- Surveys of Research and Experimental Development;
- Household Expenditure Survey; and
- Labour Force Survey.

23.105 As previously mentioned, the basic compilation framework for the ICT satellite account was the national accounts 'supply and use' system. It was adapted to focus on ICT products and the industries producing or distributing those products. Fundamentally, the system consisted of a supply table that tracked the supply of ICT products from imports and from Australian producers, and a use table that tracked the use of those products by industries, government, households and for export. In order to satisfy the identity that the supply and use of products must be equal, discrepancies due to deficiencies in the source data were identified and resolved. A great strength of the framework was that it facilitated this data confrontation and provided a basis for optimising the quality of the overall estimates in the face of deficiencies and gaps in data coverage.

23.106 International experience showed that the measurement of ICT transactions was not easy, particularly given the intangible nature of software, the licencing and leasing arrangements involved and the bundling of ICT products. It was therefore inevitable that a range of significant data and other issues required close attention in producing the ICT satellite account. Appendix 5 of the *Australian National Accounts: Information and Communication Technology Satellite Account, 2002-03* (cat. no. 5259.0) provides an outline of this issues. Inevitably, a number of judgement calls were necessary to integrate the data. Consequently, the results were considered experimental.

## Household satellite account

23.107 The 2008 SNA recommends inclusion of part of households' non-market production within the production boundary and the use of a satellite account for recording the other part. The 2008 SNA production boundary includes subsistence production in agriculture, other goods produced by households for their own consumption, the own-account construction of dwellings and housing services provided by owner-occupied dwellings, and paid services of domestic servants in the household sector. Excluded are services generated from unpaid work, including services for the producing household, services for other households and volunteer and community work.

23.108 The 2008 SNA suggests that, in practice, goods produced in households for own use are to be included within the production boundary if the production is believed to be quantitatively important in relation to the total supply of those goods in the country concerned. The ASNA includes an imputation for the market value (less the input cost) of the more common types of such production in Australia (fruit, vegetables, eggs, beer, wine and meat) for inclusion in estimates of household final consumption expenditure. An estimate for such 'backyard production' is also included on the income side of the accounts, as part of gross mixed income.

23.109 A number of commentators, including Ironmonger[65], have expressed concern that the production boundary records only a partial picture of the production of household goods and services and the accompanying use of capital and labour. For example, household members can obtain goods and services by buying them from the market. This activity is fully captured in the national accounts. Households can also produce goods and services entirely themselves, using their own labour and capital. While such production of goods will be captured if it is significant, the production of services (other than housing services provided by owner-occupied dwellings) is not measured in the national accounts. However, to the extent that the non-market production of services involves the use of market inputs, then that use of market inputs would be measured in the national accounts.

23.110 The exclusion of most forms of household non-market production of services from the national accounts is due, in part, to the difficulties in measuring non-market output. In particular, non-market activities, by their very nature, must be valued using imputations and it is not always clear what these imputations should be. Also, it is more difficult to define non-market production than to determine the scope of market activity. Because of these concerns, national accountants generally hold the view that broadening the accounts to include a wide range of non-market activity would produce a less useful tool for analysing overall economic activity.

23.111 Nonetheless, as economic activity crosses over from non-market to market, or vice versa, this can lead to distortions in the accounts. A classic example is the marriage of a housekeeper to his or her employer. Prior to the marriage, the housekeeper's output (presuming that housekeeper was being paid a wage) was included in GDP. After the marriage, the same output is excluded if the new spouse is not paid a wage. However, there has been no change in underlying economic activity. Only the institutional arrangements underlying the activity have changed.

23.112 In order to provide a more comprehensive picture of economic activity, the 2008 SNA suggests that satellite accounts be used. Household satellite accounts are where the concepts, in particular the production boundary, underlying the core accounts are altered, but they do this in such a way that there are clear linkages with the core accounts. These can be compiled in both monetary and non-monetary terms. Thus it would be possible, for example, to make non-monetised comparisons based on time spent in formal and informal economic activity as well as to monetise unpaid work, if so desired. Therefore, a household satellite account can provide comprehensive information on household economic activity within a framework that is consistent with the core national accounts, without subjecting the core accounts to the vagaries associated with defining and measuring household non-market output.

[65] Ironmonger, Duncan, *The Value of Care and Nature Provided by Household Work*, Family Matters, No. 37, April 1994.

23.113 It is possible to widen the scope of household activity to look at frameworks that encompass not only household production but also describe consumption, saving and accumulation of wealth activities in households. This could be done at either the macro or micro level, that is, at the level of the household sector as a whole or disaggregated by types of household. A macro framework has been developed by Eurostat and a provisional micro framework has been developed by the ABS. Statistics Netherlands has developed a framework that seeks to show macro-micro linkages. Each of these frameworks is discussed below.

### Valuation approaches

23.114 As mentioned above, one of the main issues in measuring non-market household production is to determine an appropriate method for valuing the production. Three approaches have been suggested:

- the unpaid work approach;
- the input approach; and
- the output approach.

23.115 The most common method used to date has been the unpaid work approach, which takes account only of (unpaid) working time and its imputed value. ABS studies to date have used this approach.

23.116 The input approach values household production as the sum of the values of all of its inputs: time use, intermediate consumption, and capital costs.

23.117 The output approach values household production at its imputed output value, in the same way that in-scope household non-market production is valued in the core national accounts.

#### *Unpaid work approach*

23.118 The essence of this approach is to multiply hours of unpaid work, usually obtained from a time use survey (TUS) by an appropriate wage rate. The first Australian unpaid work study, published in 1990, used data from a 1987 pilot TUS. Three basic methods of valuation were used:

- the opportunity cost method;
- the individual function replacement cost method; and
- the housekeeper replacement cost method.

23.119 Each of these methods used wage rates that were on a 'before-tax', or gross, basis.

23.120 The second study, completed in 1994, used data from the first national TUS of 1992 and retained these three methods. It refined the housekeeper replacement cost method and also distinguished between a gross opportunity cost method and a more appropriate net opportunity cost method, based on after-tax wage rates. The individual function and housekeeper replacement cost methods remained on a gross basis.

23.121 The third Australian study, completed in 2000 and based on the results of the 1997 national TUS, used the same methods as the second study, and also introduced a hybrid of the individual function and housekeeper replacement cost methods.

23.122 A more detailed discussion of this approach is outlined in the Unpaid work section below.

*Input-based approach*

23.123 Under this approach, the household is regarded as a production unit in which commodities and services are produced by combining work, intermediate consumption and household durables. This approach allows for better integration of household production into the system of national accounts. The formula used is as follows:

Value of labour
+ wages paid to domestic servants
+ taxes less subsidies on production
= *net value added*
+ consumption of fixed capital
= *gross value added*
+ intermediate consumption
= *gross output*

23.124 This formula is similar to that used in the national accounts to value the non-market output of the general government and non-profit institutions serving households sectors. The input-based approach was used by the German Federal Statistical Office in its estimates of the value of German household production in 1992.

23.125 In measuring the non-market output of households using the input-based method the value of labour component obviously relates to unpaid labour. Accordingly, the observations in the preceding section on the unpaid work method also pertain to this component.

23.126 The taxes less subsidies on production component refers to transfer payments made by households to governments and vice-versa that are recorded as secondary income transactions in the core national accounts but would be considered to relate to non-market household production. These transfer payments would then be reclassified in the household satellite account.

23.127 The consumption of fixed capital component relates to the depreciation of household durables used in the household production process. In the core accounts, purchases of durables (e.g. motor vehicles, refrigerators, washing machines) by households are recorded as final consumption expenditures and not as capital formation. In the satellite accounts, household expenditure on consumer durables would need to be reclassified from final consumption to gross fixed capital formation.

23.128 The more difficult aspect of measuring the consumption of fixed capital component would be in actually determining the appropriate amounts of depreciation in each period. The 'perpetual inventory method' (PIM) would require information about the decline in the efficiency of assets as they age, asset lives, the distribution of these lives about the average life, and changes in the price of assets. The ABS currently provides estimates of the stock of household durables as a memorandum item in the national accounts balance sheets. These data could be used as a starting point for deriving estimates of consumption of fixed capital.

23.129 The intermediate consumption element would consist of goods and services acquired by households that are used up in household production. To the extent that this production fell outside the production boundary, measuring the associated intermediate consumption would require identifying and reclassifying expenditures treated as final consumption in the core accounts. For some goods or services, it would be reasonable to assume that all expenditure on them should be classified to intermediate consumption. For example, meat purchases would all be classified to intermediate consumption because meat products generally have to be prepared or cooked before they are ready for a meal. Other goods or services could be used in production or as final consumption. For example, ice-cream can be eaten as such or used as an ingredient in desserts. As it is usually eaten directly, it would probably be allocated to final consumption. On the other hand, fruit, even though it is eaten mostly fresh, might have to be allocated to intermediate consumption as most fruits that are eaten fresh need to be rinsed, peeled, stored and distributed. The alternative to allocating expenditure on a particular product to either intermediate consumption or final consumption would be to split expenditure based on studies of the use of the product.

23.130 In deciding which expenditures should be classified as capital and intermediate in the household satellite account, the ABS would consider work already undertaken internationally in this area.

23.131 Estimates of household production developed using the input-based method could be presented in their own right or used to develop alternative estimates to those shown in the core accounts.

*Output-based approach*

23.132 In the output-based valuation method, the gross output from household non-market production is valued by multiplying the volume of household output for different activities by market-equivalent prices for each activity. The rationale for this approach is that given market goods and services could replace those generated in the household, the most appropriate way of valuing household non-market production is to use the prices of similar market production. Under the output-based method, the gross value added in household production is equal to the value of gross output less the value of intermediate inputs (where intermediate inputs are as described in the preceding section).

23.133 This method is considered to be the best for comparisons with national accounting aggregates, which are generally based on the use of market prices for valuing output. Valuing output in this way ensures that outputs are valued independently of their inputs, and avoids problems arising because of productivity differences between market and non-market producers.

23.134 The output-based approach resolves the issue of the joint production of services through simultaneous or parallel uses of time. The value of the labour used simultaneously can be found by deducting intermediate inputs and capital costs from the market value of the joint outputs.

23.135 The data requirements for the output-based approach are extensive and not readily available, particularly data on the volume of household output for different activities and corresponding market-equivalent prices. For this reason there have been very few output-based studies to date.

Examples of household satellite accounts

*Input-output tables*

23.136 A satellite account for household production could be presented in the form of an input-output table. Such a presentation would provide breakdowns of the value added (into capital and labour components) and intermediate consumption (into the various types of products used up in the production of household output) for each type of household output. Non-household production would also be shown so that the relationships between the economic activity of households and that of the other sectors of the economy could be explored. Supplementary information on the volume of household outputs or the time spent in the production of the outputs could also be shown. The value of household outputs could be derived using either the input- or output-based methodologies.

23.137 Ironmonger and others have argued that the development of such an input-output table is essential for a proper analysis of household economic activity. Thoen[66] lists the advantages of placing household production within an input-output framework:

> *'household production can be linked to the SNA through the development of a satellite account with links through 'personal expenditures' which are common to both accounts: the complex interdependence between household and market activities in terms of the raw materials, intermediate goods and services, or labour inputs required to produce outputs can be analysed within a familiar accounting framework: the impact of macroeconomic policy on the 'household sector of the economy' can be analysed in terms of the substitutability of market supplied services for household production and the household capital/labour ratio and, consumer demand can be linked to the underlying household activities.'*

23.138 Deriving a household satellite account in the form of an input-output table would be a more difficult exercise than deriving estimates of household production in aggregate because each of the components of production (labour, capital and intermediate consumption) would have to be allocated across the various types of household products. Ideally, this would be done based on studies of the various types of household activities. In the absence of pre-existing studies, it would be expensive to undertake such studies and it is highly unlikely that such expense could be justified. Alternatively, in cases where the allocation of a component is not clear-cut, indicators (such as the time spent on activities) could be used as a basis of allocation. However, this would reduce the usefulness of the input-output approach, as any analysis based on the relationship between inputs and outputs would be affected by (unknown) errors in the allocation process.

[66] Thoen, M., *The value of household production in Canada 1981-1986*, Statistics Canada, National Accounts and Environment Division, April 1993.

*Eurostat proposal*

23.139 Eurostat commissioned Statistics Finland to develop a harmonised satellite system of household production. The Eurostat proposal is based on the European System of National and Regional Accounts (ESA 95), which is broadly consistent with the 1993 SNA. While Eurostat acknowledges that the output-based method has analytical advantages compared with the input-based method, it advocates the latter as the basis for measuring household production as there are currently insufficient data available to implement the former. However, the proposal recognises that an output-based method could eventually be implemented. The focus of the system is the production account. However, the proposal has guidelines for adjusting the core income and capital accounts to provide comprehensive information on the consumption, income, saving and wealth of households. Such information would increase the analytical usefulness of the system as a whole.

23.140 If a satellite production account could be compiled that covered household production comprehensively, relatively little effort would be required to compile consistent income and capital accounts along the lines suggested in the Eurostat proposal.

*Household income, consumption, saving and wealth (ICW)*

23.141 The ABS has been at the forefront in the development of a conceptual framework for household income, consumption, saving and wealth (ICW). This framework was developed by the ABS in response to the process of revising the provisional 1977 United Nations (UN) *Guidelines on Distribution of Income, Consumption and Accumulation of Households* (known as M61). The UN guidelines were issued to assist countries to collect and disseminate income distribution statistics and to provide for international reporting and publication of comparable data. The provisional guidelines had a particular emphasis on linking income distribution statistics to current national accounting standards (they relate to the 1968 version of the System of National Accounts). There have been continuing demands for revisions to the 1977 UN guidelines to supplement the 1993 SNA. In particular, a need is seen to broaden the concept of income and develop analytical techniques to measure income inequality.

23.142 The ABS framework, published in *A Provisional Framework for Household Income, Consumption, Saving and Wealth* (cat. no. 6549.0), describes how the range of flows and stocks of household economic resources can be brought together to provide a comprehensive measure of economic wellbeing for individual households. The framework also provides a conceptual link between these components of individual household economic wellbeing and those of the national economy as a whole. As such, the concepts and terminology used in the ICW framework are consistent with those used in the national accounts. However, because the focus of the ICW is on the individual household rather than the household sector, concepts, definitions and terminology have been modified where necessary.

23.143 More specifically the framework is designed to allow for the measurement of:

- a household's power or command over economic resources;
- the extent to which a household is able to both consume and accumulate wealth and to make choices between these options; and
- the changes that take place in a household's economic wellbeing over time.

23.144 Together, these measures constitute a model that reconciles the various elements of income, consumption and net worth at the individual household level. Such a reconciliation will enable derivation of measures of both household saving and total accumulation of wealth. The ICW presents a synthesis between economic and social statistics, particularly as they relate to the household economy. However, the ICW still has a provisional status and the ABS has not yet begun to make it operational.

23.145 It is worthwhile elaborating on the differences between the ICW and the Eurostat satellite accounting system for the household. Eurostat's system focuses on the macro-side of the economy, with the household sector being the main statistical unit. The production side of the household economy tends to be the central area of analytic interest. Production and generation of income accounts are seen as 'crucial' for the system of household satellite accounts. The input-output tables are a detailed elaboration of the household production account but represent only one part of a system of accounts for the household sector. The Eurostat framework does not provide as detailed an insight into the income flows and financing decisions of households as the ICW system does. However, it does have guidelines for an extended system of accounts that describes the behaviour of the household sector in relation to consumption, disposable income and wealth. The ICW focuses on the micro-side of the economy, with four possible statistical units to measure the economic wellbeing of the population: persons, households, families and income units. The area of

analytic interest is broader than the Eurostat central focus on production, with emphasis on how economic resources are mobilised within households and affect the different variables of household income, consumption, saving and wealth. Considerable work would be needed to further integrate the two systems. Integration would give better information on the dynamics of individual households, the household sector and the linkages to the market economy.

*The Netherlands approach*

23.146 The Netherlands Central Bureau of Statistics started the development of satellite accounts of household production in 1991, using data from their national TUS conducted in 1987. Another TUS was conducted in 1998 and the data from that TUS are to be incorporated in the development of a System of Economic and Social Accounting Matrices and Extensions (SESAME), a form of a social accounting matrix (SAM). Traditionally, SAMs have been applied to specific types of analysis, focusing on causes and consequences of various aspects of inequality among household groups.

23.147 A SESAME is a 'core' SAM that has associated satellite tables and it provides a set of monetary and non-monetary macro-indicators potentially encompassing social, economic and environmental change. Such an integrated set of satellite tables can show:

- 'various stocks underlying the SAM flows, such as size and composition of the population by household group (including the potential labour force), production capacity by industry and the possession of assets (e.g. agricultural land, consumer durables and financial assets) and liabilities (e.g. external debts) by sub-sector;
- a decomposition of (changes in) values into (changes in) volumes and prices: this refers not only to products but also to various categories of labour services, and to fixed capital formation by industry;
- related non-monetary socioeconomic indicators, such as life expectancy, infant mortality, adult literacy, nutrient intake, access to (public) health and education facilities, and housing situation by household group; and
- some re-routings (e.g. final consumption by household group paid for by government and nonprofit institutions serving households (NPISHs).'

23.148 The Dutch system utilises an extra layer of operational principles to define the framework of its SAM for the household economy. In addition to defining productive activities by utilising the third person criterion (Chapter 3), it also defines productive activities in terms of formal and informal activities. The operational principle used is as follows:

*'Informal activities are productive activities which do not contribute to the national income as currently defined, and in which unpaid labour is involved.'*

23.149 When these principles are operationalised into a SAM there is a consistent representation of both the production processes and the income distribution and income spending processes. The system makes explicit the linkages between the formal and informal economies in terms of production and income generation and distribution and has entry points for data on fixed capital and consumption of fixed capital in the informal economy.

23.150 A key feature of this system is that goods and services in the informal sector are not always given a monetary valuation. The SAM is split up into two parts, making the module independent from the valuation of informal labour. The first part shows all transactions, expressed in monetary value, with the value of informal labour as zero. In the second part, all informal transactions are expressed in informal labour equivalents, such as working years, derived from the TUS. The Dutch see this framework as allowing formal and informal labour to be merged without disturbing the consistency in valuation. Various kinds of multiplier analyses can be applied where pricing is not a prerequisite. Future extensions will include informal fixed capital formation and a further disaggregation of labour by type, for example, by education level or position within household. Any number of disaggregations and micro-economic analyses could be made if the data were available, for example, data by household type. At this stage the framework is in place but very few of the cells have been developed.

## Unpaid work

### Production boundary and unpaid work

23.151 In the 2008 SNA, the 'general production boundary' is defined in paragraph 6.24 as encompassing all activities 'carried out under the control and responsibility of (institutional units) that use inputs of labour, capital and goods and services to produce outputs of goods and services'. Most unpaid work fits within this definition. The production boundary used in the 2008 SNA, however, is more restricted than the general production boundary. Production is defined in paragraph 6.27 as excluding the value of most unpaid work and as comprising:

> *'(a) the production of all goods and services that are supplied to units other than their producers, or intended to be so supplied, including the production of goods or services used up in the process of producing such goods or services;*
>
> *(b) the own-account production of all goods that are retained by their producers for their own final consumption or gross capital formation;*
>
> *(c) the own-account production of knowledge-capturing products that are retained by their producers for their own final consumption or gross capital formation but excluding (by convention) such products produced by households for their own use;*
>
> *(d) the own-account production of housing services by owner-occupiers; and*
>
> *(e) the production of domestic and personal services by employing paid domestic staff.'*

23.152 Therefore, the 2008 SNA excludes from production all own-account production of services (which are the equivalent of 'unpaid household work') within households other than services produced by employing domestic staff and housing services produced by owner-occupiers. The 2008 SNA also omits from production the value of volunteer and community work that is provided free by householders to non-profit institutions or other households. The value of this work is not included in the costs of production of the recipients of the services generated by the unpaid work.

### Definition and scope

23.153 A prerequisite for the measurement of total unpaid work is a satisfactory definition of what constitutes such work. The boundary between productive and non-productive activity is not clearly distinguishable in many cases. For example, the distinction between unpaid work and leisure is often very difficult to draw.

23.154 A widely accepted principle for determining the scope of total unpaid work is the 'third person' or 'market replacement' criterion originally stated by Reid[67] in 1934, and re-quoted by many writers;

> *'Household production consists of those unpaid activities which are carried on, by and for the members, which activities might be replaced by market goods or paid services, if circumstances such as income, market conditions and personal inclinations permit the service being delegated to someone outside the household group'.*

23.155 Under this criterion a household activity would be considered as unpaid work if an economic unit other than the household itself could have supplied the latter with an equivalent service.

23.156 Arguments can be made for and against the inclusion of some of the activities that would qualify as unpaid work by applying Reid's 'third-party' criterion. Many household activities that meet the Reid criterion, for example cooking and shopping, could be considered leisure activities in a number of circumstances. In the Australian studies, travel to/from work has been excluded from unpaid work because it is not possible to hire someone to travel to work on one's behalf and it is also clearly associated with paid employment rather than household production. Work done from home in relation to paid employment (for example, telephoning clients) which is unpaid but frequently a necessary part of the job, has been classified with paid activities and excluded from estimates of unpaid work. The unpaid assistance provided by relatives and others in family businesses has also been excluded, as the value added by such activities is already included in production in the national accounts.

[67] Goldschmidt-Clermont, L., *Unpaid Work in the Household*, International Labour Organisation, page 4, 1984.

23.157 Caring for others, for example playing with children, from some perspectives is a debatable inclusion in unpaid household work, even though it satisfies the third person criterion. Individuals perceive the status of these activities differently. Some people would view the raising of children as unpaid work, while others would view it as something more akin to leisure. Some would argue that these caring activities should not be classified as work or leisure but something else—they are activities that satisfy biological and cultural codes of behaviour to ensure desirable outcomes for the whole of society. Despite these reservations the Australian studies include caring in the scope of unpaid household work. However, the ABS recognises that the distinctions between paid work, unpaid work and leisure are still subject to world-wide debate and refinement.

23.158 In summary, unpaid work is defined in the Australian studies as comprising unpaid household work and volunteer and community work. Unpaid household work consists of domestic work about the house, child care and shopping and associated communication and travel. The following list gives a broad indication of the activities included under various categories of unpaid work.

- domestic work has been classified into broad groups as follows:
    - food preparation and clean-up: includes the cooking and serving of meals, and washing dishes;
    - laundry and clothes care: includes washing, ironing, mending and making clothes;
    - general housework: includes cleaning the bathroom/toilet, vacuuming, dusting and tidying;
    - grounds and animal care: includes gardening, pool care and feeding and tending to animals;
    - home maintenance: includes repairs or improvements to the home, equipment, and motor vehicles and chopping wood; and
    - household management: includes paperwork, bills, budgeting, organising, packing, selling household assets and disposing of rubbish.
- child care – includes the physical, emotional and educational care of children and general interaction with, and supervision of, children;
- shopping – includes the purchasing of a wide range of goods and services for people in the household - purchasing durables and consumer goods and purchasing repair services, administration services, child care, domestic and gardening services etc.;
- volunteer and community work – includes the physical care of adults, doing favours for others and active involvement in various forms of unpaid voluntary work;
- all communication and travel associated with unpaid work is also included within the scope of unpaid work.

### Valuation methods

23.159 Two basic approaches to measuring unpaid work are identified: the 'direct' or 'output' method; and the 'indirect' or 'input' method. The first method involves the measurement of output by direct observation of prices and requires data on the quantities of services produced. This method is considered to be conceptually superior because it adopts the same approach as that used to value market production and is therefore appropriate for comparisons with national accounting aggregates. In general, data to apply the output method are not available and the ABS, like most statistical agencies, has used 'indirect' or 'input' methods to measure the value of unpaid work.

23.160 'Indirect' or 'input' methods involve valuing output in terms of the cost of inputs and require information about the time spent on household work which, in Australia, is provided by TUSs. It is similar but not identical to the approach adopted in the 1993 SNA for valuing other non-market output, for example, non-market services produced by government. However, non-market output is valued using all relevant costs of production. In valuing unpaid work the ABS and most other practitioners use only labour inputs. There are two broad approaches to this application of the input method.

- The *market replacement cost* approach, i.e. what it would cost households in wages to hire others to do the household work for them. Three variants of this approach are:
  - individual function replacement cost approach;
  - housekeeper replacement cost approach; and
  - replacement cost hybrid approach.
- The *opportunity cost* approach, i.e. what household members would have earned in wages had they spent the same amount of time on paid work as actually spent on unpaid work. Two variants of this approach are:
  - gross opportunity cost approach; and
  - net opportunity cost approach.

23.161 The ABS recommends the replacement cost approaches in preference to the opportunity cost approaches. However, estimates based on opportunity cost have continued to be derived to provide data that can be compared with opportunity cost estimates produced in the past or by other countries.

*Replacement cost approach*

Individual function replacement cost approach

23.162 The individual function replacement cost approach assigns values to the time spent on unpaid work by household members according to the cost of hiring a market replacement for each individual function. Thus, for example, time spent on cleaning is valued using a rate of pay for commercial cleaners, and time spent on child minding is valued according to the rate of pay for child care workers. Use of this method is based on the key assumption that household members and market replacements are equally productive in their work activities.

23.163 It is not easy to determine an appropriate market rate of pay for household activities because commercial rates may embody a level of skill, responsibility or capital not required or reflected in household work.

23.164 The estimates derived using the replacement cost approaches will underestimate or overestimate the contribution of unpaid work to GDP depending on the relationship between the productivity of households and the market sector. If households and market producers are equally productive, that is, if they have the same average output per hour, the replacement cost approaches undervalue unpaid work by ignoring the contribution of non-labour inputs (e.g. capital). If households are more productive, the replacement cost approaches further understate the value of unpaid work because a household will do more work in a given time than a replacement would. If, on the other hand, households are less productive, (if they have, say, access to less capital or technology), the value estimates will be too high because they will be derived by multiplying market wages by the longer time that will be taken by households to do the same amount of work.

23.165 Two questions concerning the choice of an appropriate average wage concept are:

- Whether gross or net wages are most appropriate?
- Whether actual or paid working time should be used?

In the Australian compilations for 1992 and 1997, a gross wages concept, weekly ordinary time earnings, was preferred.

23.166 It could be further argued that total labour costs should be used, including employers contributions to superannuation, fringe benefits and workers compensation schemes. However, such data are not available in Australia by occupation on a per hour per employee basis. For this reason estimates of unpaid work including such additions to gross wages have not been calculated.

23.167 Regarding use of actual or paid working time, the latter is determined by law or collective agreements, and includes paid holidays and paid sick leave. Actual working time refers to the time spent actually working and includes paid and unpaid overtime but excludes public holidays and weekends (except in cases where a worker does work at those times).

23.168 In Australian studies the concept of paid working hours was used. Hourly wage rates were obtained by dividing weekly ordinary-time earnings by ordinary-time hours paid for. (Ordinary-time excludes overtime.) 'Ordinary-time hours paid for' refers to employees' standard or agreed hours of work that are paid at the ordinary-time rate. It includes stand-by or reporting-time hours that are part of standard hours of work, and any part of annual leave, paid sick leave or long service leave taken during the reference period.

#### Housekeeper replacement cost approach

23.169 The housekeeper replacement cost approach values the time spent on unpaid household work by household members according to the cost of hiring a housekeeper to undertake the relevant tasks.

23.170 The key assumption underlying this approach is that household members and housekeepers are equally productive in performing household work, which may or may not be true. For example, a housekeeper is likely to be more productive at cleaning than a household member who may also be looking after small children. Alternatively, a housekeeper may clean more quickly but less thoroughly than the household member. Use of this approach also assumes that there is a well-established labour market for persons who undertake all household tasks, which is not the case in Australia in the 1990s.

23.171 In both the 1992 and 1997 estimates, a female wage rate for domestic housekeepers was used as there was no male wage rate available. The tasks identified in the category included:

- preparing, cooking and serving meals and refreshments;
- purchasing food and household supplies;
- washing dishes, kitchen utensils and equipment, sweeping and washing floors and vacuuming carpets, curtains and upholstered furnishings;
- dusting and polishing furniture, and cleaning mirrors, bathrooms and light fixtures; and
- washing and ironing garments, linen and household articles.

23.172 In the 1992 and 1997 estimates the housekeeper wage rate was used to value all household tasks including those that would not normally be undertaken by a housekeeper.

23.173 The housekeeper replacement cost approach is only applicable to the derivation of the value of unpaid household work and does not apply to the derivation of the value of volunteer and community work. Estimates of the value of total unpaid work under a housekeeper replacement cost heading are derived by adding estimates of unpaid household work derived using the housekeeper replacement cost approach to estimates of volunteer and community work derived using the individual function replacement cost approach, based on the persons wage rate.

#### Replacement cost hybrid approach

23.174 Under this approach the housekeeper wage rate was applied to those tasks normally carried out by a housekeeper (as described in the previous section). The value of tasks not normally undertaken by a housekeeper was estimated using the wage rates employed in the *individual function replacement cost* approach. The hybrid approach would appear to be appropriate given that Australians typically hire housekeepers to clean house interiors, manage laundry and occasionally prepare meals while they hire specialists to carry out child care, household maintenance and gardening tasks. The hybrid approach was not used in the compilation of the published estimates for 1992.

### *Opportunity cost*

#### Gross opportunity cost

23.175 The gross opportunity cost approach values unpaid work in terms of the earnings assumed to be foregone by householders when they devote time to unpaid work rather than paid employment. The approach is based on the assumption that the value of time spent doing unpaid work at home equals its 'opportunity cost' elsewhere, i.e. the valuation of the next best alternative use. The assumption is made that the worker has given up paid work in order to perform unpaid work and that its value per hour is equal to the

individual's marginal hourly wage in the market. In other words, to do an extra hour of unpaid work, an hour of paid (market) work is given up. However, in practice, the total time spent on unpaid work is multiplied by the *average wage* applicable to relevant groups in the population.

23.176 There are many problems with this approach. Some particular reservations are outlined below:

- Labour market structures – the gross opportunity cost approach does not represent the way the choice between paid and unpaid work is made. Most workers have limited choice in the short run regarding the hours they have to work and few have the option to refuse overtime.
- Employment status – this method does not hold up well when patterns of labour force participation other than a rigid fixed-hours working week are considered.
- 'Psychic income' – a probably unquantifiable but theoretically precise valuation would take account of the worker's net psychic income from doing unpaid work and from doing paid work, i.e. where the net psychic benefit equals the psychic benefit from doing unpaid work minus the psychic benefit from paid employment.
- Relevance of market wage rates for individual workers – the question is how is the 'foregone wage' to be determined when an unpaid household worker has had no market employment and therefore an indeterminable potential wage?

23.177 Opportunity cost measures tend to be higher than those for the housekeeper replacement cost approach because wages for professional housekeepers are lower than the economy-wide average wage which is used for the opportunity cost approach. In view of the above discussion, the opportunity cost approach will give useful results only if very strict and probably implausible assumptions apply,

- at the margin, time devoted to unpaid work precludes market work;
- the value of time at the margin is gross hourly wages; and
- the average potential hourly earnings of the not-employed are equal to the average hourly earnings of the employed.

23.178 In the Australian studies relating to 1992 and 1997, estimates of unpaid work using the gross opportunity cost approach have been produced using average male and female wage rates, and also using the persons' average wage rate. The ABS regards the gross opportunity cost approach as the least appropriate of the estimation methodologies.

Net opportunity cost

23.179 The decision to undertake paid work as an alternative use of time to unpaid work could reasonably depend on the remuneration (wages and salaries, superannuation and fringe benefits) after tax and any work-related costs. The net opportunity cost approach recognises this and recommends valuation of unpaid work at the after-tax hourly wage rate less work-related expenses plus income by way of employer costs of superannuation and fringe benefits.

23.180 The rationale behind this approach is that the unpaid worker will be equating the value of doing unpaid work with the net benefit of working in paid work conferred by this 'adjusted' hourly wage rate. In the Australian context, estimates of the wage rate applicable to a net opportunity cost valuation are derived by subtracting from average annual ordinary time earnings, the relevant taxes and levies payable and work-related expenses, and adding to the result the imputed employer on-costs relating to superannuation and fringe benefits and then converting the final result to an hourly wage rate.

23.181 The calculation of the net opportunity cost wage rate is really an attempt to find the appropriate and most realistic net wage rate. Ideally, a number of other factors should also be taken into account, if it were possible to measure them. For example, there is the question of whether tax rebates and social security benefits should be taken into account. In the Australian context these include family allowances, family income supplements, medical insurance rebates, and a variety of means-tested welfare programs. Indeed, the net opportunity cost of working in the paid work force could well be negative in some cases.

### Data sources

23.182 The preparation of the 1997 estimates of total unpaid work presented in this paper required the following sets of data:

- estimates of average time spent on household work obtained from the 1997 TUS;
- population estimates from the Census of Population and Housing;
- appropriate wage rates from the Survey of Employment, Earnings and Hours as well as the Labour Force Survey; and
- work related expenses from the Household Expenditure Survey.

### Limitations

23.183 The main limitations of the unpaid work approach are:

- the contribution to the value of household production that comes from other inputs (e.g. intermediate consumption and capital) is not captured;
- it cannot provide information on the labour productivity of household production;
- it cannot be used to analyse whether households are more efficient in their production than comparable market units;
- it does not take into account the joint production of services through simultaneous or parallel uses of time;
- a choice is required among multiple wage rates and valuation methodologies, each of which have their limitations.

23.184 With regard to the last point, the pros and cons of the various approaches are well summarised in a 1999 Eurostat document entitled *Proposal for a satellite account of household production.*[68] (This proposal is discussed in more detail in the section 'The Eurostat Proposal'.) The document provides the broad consensus of national accountants in Europe about the preferred method of valuation of the labour input into household production. Of the possibilities, Eurostat recommends that the housekeeper replacement cost method is the most appropriate method to use to value household labour. The reasons cited include:

- the nature of the work performed by a housekeeper is rather similar to the nature of housework performed by a household member;
- housekeeper productivity is similar to that of the householder, as regards the performance of several household activities simultaneously, the quality of household equipment used and the amount of intermediate consumption involved; and
- the method of valuation is simple and straightforward.

23.185 A potential problem with the housekeeper replacement cost method is that a housekeeper does not perform all the tasks undertaken in households, such as household management, home maintenance, servicing vehicles and volunteer work. Using this approach then could possibly see an undervaluation of the labour input to household production unless those tasks not typically undertaken by a housekeeper were also included in the valuation on the basis of specialists' wages (in effect utilising a hybrid of the housekeeper replacement cost and individual market replacement cost methods).

23.186 As to the issue of gross or net wages Eurostat recommends that gross wages, which include income tax and social security contributions paid by the employer and employee, be used, although it acknowledges that net wages do have certain advantages from a theoretical point of view. However, net wage statistics are generally not available on an occupational basis. (This is one of the reasons that Australia uses the gross wage concept in its valuation of unpaid work using the replacement cost methods).

[68] Eurostat (1999), *Proposal for a Satellite Account on Household Production*: 9/1999/A4/11

ENVIRONMENTAL-ECONOMIC ACCOUNTS

## Introduction

23.187 This section describes the notion of environmental-economic accounts and the underpinnings of those environmental-economic accounts produced by the ABS. The environmental-economic accounts produced by the ABS follow the recommendations of the United Nations' System of Environmental-Economic Accounting (SEEA). The SEEA is now an international statistical standard, but had its genesis as a satellite system of the SNA. As a result the SEEA utilises concepts, structures and methods that are largely consistent with those used in the SNA, which allows the SEEA to integrate environmental and economic information within a single framework.

23.188 Over the past 50 years macro-economic policy has largely been based on information flowing from the SNA framework and the aggregates it produces. However gross domestic product and national income fail to capture many vital aspects of national wealth and well-being, such as changes in quality of health, extent of education, social connection, political voice, unpaid household work, and changes in quality and quantity of natural resources. Further, GDP actually includes 'defensive expenditures' such as spending on household security, health and environmental protection. This is because the SNA measures activity within 'the market'.

23.189 It is well understood however, that much of what maintains and enhances well-being occurs outside the market. For example within the SNA, environmental goods and services are considered to be 'non-market', implicitly superabundant, free inputs to production. As a result, they are used as inputs to production, but not charged as costs of production. In effect,

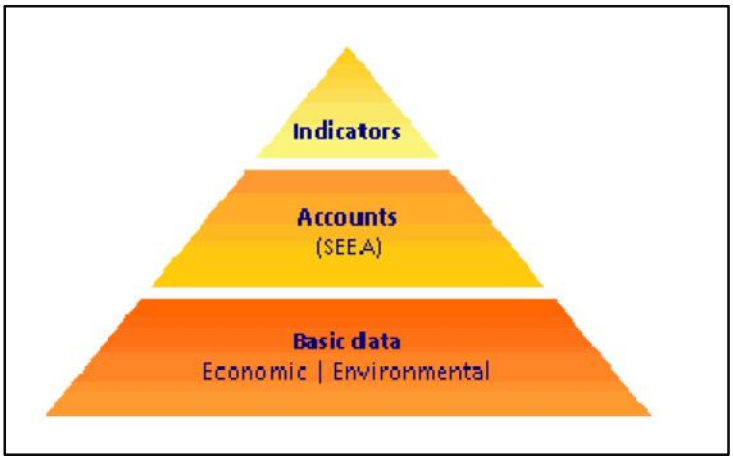
> *"A country could exhaust its mineral resources, cut down its forests, erode its soil, pollute its aquifers, and hunt its wildlife to extinction, but measured income would not be affected as these assets disappeared." (Repetto et al. 1989)*

23.190 A key limitation of the economic information system is that it cannot answer some of the higher order questions policy-makers (and society) are asking. In particular, it does not appropriately describe the relationship between the environment and economy.

23.191 Therefore, a comprehensive analysis of environmental issues, and the policy responses to deal with these, must be informed by socio-economic information about drivers, pressures, impacts and responses. And this information should be integrated with the associated bio-physical information so that relationships and linkages can be properly understood.

23.192 Environmental-economic accounts provide a conceptual framework for integrating the environmental and economic information systems. Similarly, organising environmental and economic information into an accounting framework has the capacity to improve basic statistics, and allows for the calculation of indicators which are precisely defined, consistent and interlinked, as illustrated in Figure 23.1.

Figure 23.1 THE INFORMATION PYRAMID



## The System of Integrated Environmental and Economic Accounting

23.193 The conceptual model adopted by the ABS and the international statistical community for environmental-economic accounts is the United Nations' System of Environmental- Economic Accounting (SEEA), which was endorsed by the United Nations Statistical Commission as an international statistical standard in February 2012. The structures, concepts and classifications used in the SEEA are consistent with those used in the SNA, meaning that accounts produced under the SEEA support the bringing together of environmental and economic information within a common framework. This allows for consistent analysis of the contribution of the environment to the economy, the impact of the economy on the environment, and the efficiency of the use of environmental resources within the economy.

23.194 The SEEA framework, like the SNA, utilises flow and stock accounts containing estimates expressed in monetary terms. However, more broadly, the SEEA utilises the following four types of accounts:

- *Physical flow accounts* record flows of natural inputs from the environment to the economy, flows of products within the economy and flows of residuals generated by the economy. These flows include water and energy used in production (e.g. of agricultural commodities) and waste flows to the environment (e.g. solid waste to landfill).

- *Functional accounts for environmental transactions* record the many transactions between different economic units (i.e. enterprises, households and governments) that concern the environment. Functional accounts may explicitly identify environmentally-related transactions contained within standard SNA accounts (such flows are not explicitly shown within typical SNA presentations). For example, Environmental Protection Expenditure (EPE) accounts disaggregate traditional national accounting flows to reveal those monetary transactions relevant to environmental protection.

- *Asset accounts in physical and monetary terms* measure the natural resources available and changes in the amount available. Asset accounts focus on the key individual components of the environment: mineral and energy resources; timber resources; fish/aquatic resources; other biological resources; soil resources; water resources; and land. They include measures of the stock of each environmental asset at the beginning and end of an accounting period and record the various changes in the stock due to extraction, natural growth, discovery, catastrophic loss or other reasons.

  The compilation of asset accounts in physical terms can provide valuable information on resource availability and may help in the assessment of sustainability. A particular feature of the SEEA asset accounts is the estimation of depletion of natural resources in physical and monetary terms. For non-renewable resources the quantity of depletion is equal to the quantity of resource extracted but for renewable resources the quantity of depletion must take into account the underlying population, its size, rate of growth and associated sustainable yield.

- *Ecosystem accounts* are a developing area and not yet part of the international statistical standard. Ecosystems are areas containing a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit. Ecosystem accounts are structured to summarise information about these areas, their changing capacity to operate as a functional unit and their delivery of benefits to humanity.

  The benefits received by humanity are known as ecosystem services. They are delivered in different forms and are grouped into three broad categories:

  a. provisioning services – the benefits received from the natural inputs provided by the environment such as water, timber, fish and energy resources;

  b. regulatory services – the benefits provided when an ecosystem operates as a sink for emissions and other residuals, when an ecosystem provides flood mitigation services or when an ecosystem provides pollination services to agriculture; and

  c. cultural services – the benefits provided when an ecosystem such as a forest, provides recreational, spiritual or other benefits to people.

23.195 Each of the different types of accounts are connected within the SEEA framework but each one focuses on a different part of the interaction between the economy and the environment. Examples of the relationships between the different accounts include:

- Asset accounts and ecosystem accounts focus on the stock and changes in the stock of environmental assets, with asset accounts focusing on the individual components and ecosystem accounts focusing on the interactions within and between these components.
- Changes in the stock are often the result of economic activity which in turn is the focus of physical flow accounts. Measurement of flows of natural inputs in the physical supply and use tables is consistent with the measurement of extraction in the asset accounts and the measurement of provisioning services in ecosystem accounts.
- Measurement of flows of residuals to the environment as recorded in physical supply and use tables is an important consideration in the measurement of ecosystem services, particularly regulatory services.
- Measures of the flows of natural inputs and residuals can also be related to transactions recorded in functional accounts for environmental protection and resource management, including investment in cleaner technologies and flows of environmental taxes and subsidies. For example, payments for emission permits recorded in functional accounts can be related to the flows of emissions recorded in the physical supply and use tables and to the operating surplus of emitters and final expenditures by households.
- The effectiveness of the expenditure for environmental purposes may, ultimately, be assessed by changes in the capacity of ecosystems to continue their delivery of ecosystem services as recorded in ecosystem accounts.

23.196 These examples serve to highlight the many and varied relationships between the accounts, each taking a different perspective. Throughout the SEEA these relationships are supported by the use of common concepts, definitions and classifications.

### Valuation

23.197 One of the most challenging aspects of environmental-economic decision-making is obtaining appropriate information to inform trade-offs between the environmental assets that deliver a range of non-market goods and services, including ecosystem services, against development alternatives for which there are clearly defined economic values. The SNA and the SEEA Central Framework include the value of environmental assets that have direct economic values. For example land, timber, fish, minerals and fossil fuels are included in the national balance sheet in the *Australian System of National Accounts* (cat. no. 5204.0).

23.198 The preferred valuation in the SNA and the SEEA Central Framework is based on market transactions. However, some environmental assets and many ecosystem services are not transacted in markets, and in these instances non-market valuation techniques must be used. For example, in many countries mineral deposits are owned by the government and are not sold on active markets, rather they are extracted under a mining lease arrangement. Under these circumstances, it is recommended that the value of the mineral deposit be calculated as the net present value of future expected income resulting from the extraction of this mineral deposit.

23.199 In some cases, the value of certain ecosystem services may be included in the value of goods and services traded in markets. For example, the value of pollination is captured in the value of agricultural crop production, while tourism operators derive income from the people visiting natural attractions such as Uluru and the Great Barrier Reef.

23.200 The development of standardised methods for identifying and separately distinguishing the value of environmental assets and ecosystem services is an on-going area of work in the SEEA. The recognition of the value of these assets and services potentially provides important information to decision-makers, for example, in informing comparisons between various development alternatives.

## Integrating the environmental and economic information systems

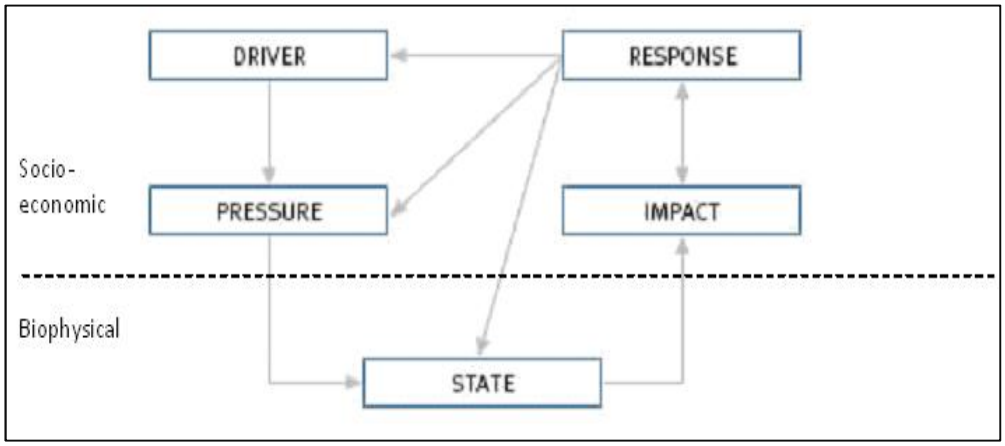
23.201 A comprehensive national environmental information system should be built on two pillars:

1. the essential bio-physical information pertaining to the state of the environment; and
2. the complementary socio-economic information on drivers, pressures, impacts and responses.

23.202 The pillars should be 'integrated' to ensure that the bio-physical and socio-economic dimensions of environmental issues can be considered concurrently in policy formulation and in other decision making. Integration is achieved by the use of common frameworks, classifications and standards. The information in each pillar should be organised so that, for each environmental domain of interest, users could seamlessly move from the bio-physical aspects to the socio-economic aspects and vice versa.

23.203 This implies that there should be a common logic for organising both the bio-physical and socio-economic information. Such logic could be built around the various environmental domains (e.g. water, air, land) organised in a driver-pressure-state-impact-response (DPSIR) framework– as depicted in Figure 23.2. The integration of information would also ensure that environmental issues that cut across domains, such as biodiversity and greenhouse gas emissions can be appropriately analysed.

Figure 23.2 THE DPSIR FRAMEWORK

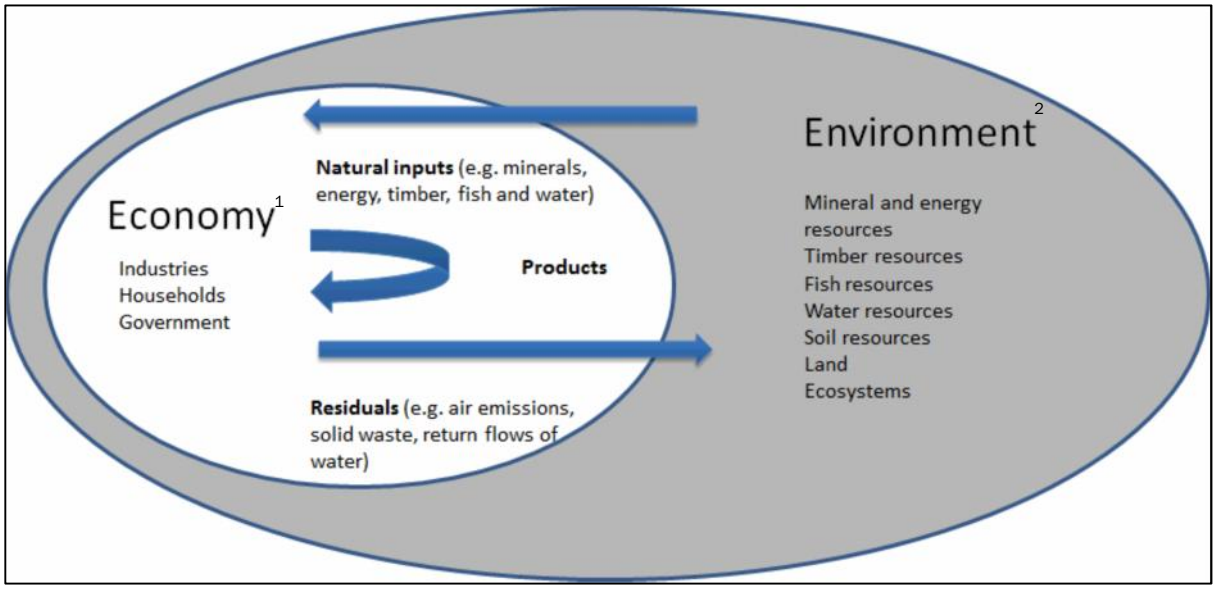



23.204 The physical stores of information could be disparate, with the expectation that much of the bio-physical information would be stored by agencies such as the Bureau of Meteorology (BoM) and much of the socio-economic information would be stored by the ABS. However, the information for both pillars would be locatable and accessed through a single portal. So from a user perspective, there would be a single virtual information system, although within this system the source of particular information sets would be clearly identifiable.

23.205 To develop such a virtual information system and to achieve integration, the ABS, BoM and other agencies would work in partnership. This would involve working together on relevant frameworks, standards and classifications, as well as the underlying logic for organising environmental information, including determining appropriate metadata requirements. Developing and maintaining the portal would be a joint responsibility of the contributing agencies.

23.206 Figure 23.3 illustrates the domain that integrated environmental-economic accounts seek to inform–in particular, it is the interaction between the economy and the environment that is the focus of our information framework. The figure further describes the various agencies engaged in integrating environmental and economic information systems, and the location of their primary institutional responsibilities.

Figure 23.3 FIGURE 3: INTEGRATING INFORMATION SYSTEMS – PRIMARY INSTITUTIONAL RESPONSIBILITIES




[1] Treasury, ABS, ABARES, PC, PM&C, DRET, state/territory organisations, etc.

[2] SEWPaC, BoM, DCCEE, Geoscience, CSIRO, MDBA, BRS, state/territory organisations, etc.

## ABS integrated environmental-economic accounts

### Introduction

23.207 Over recent years, the ABS has produced a range of individual environmental-economic accounts, including accounts for water, energy and EPE. The ABS program of environmental-economic accounts is evolving and intends to produce environmental-economic accounts across a greater range of dimensions on a regular basis. This will support the great analytical power of integrated comparisons across dimensions and over time.

23.208 A range of Australian organisations produce environmental-economic accounts. These include the Bureau of Meteorology (National Water Account and NPEI responsibilities), Department of Climate Change and Energy Efficiency (DCCEE) (GHG emissions accounts), Bureau of Resources and Energy Economics (BREE) (Energy Balances) and the Wentworth Group (Regional Accounts). While the degree varies, each of these accounts has links to the SEEA. In some cases there are relatively minor conceptual differences, in others the differences are more substantial and often due to particular legislative factors.

23.209 A variety of environmental-economic accounts have been compiled by the ABS. These accounts are at different stages of maturity and some accounts that have been compiled in the past, such as environment protection expenditure accounts, are no longer produced. Others, such as the natural resources on the national balance sheets, energy and water accounts are in regular annual production.

23.210 In some cases, such as for *Water Accounts, Australia* (cat. no. 4610.0), the ABS undertakes substantial primary data collection activity to support the production of accounts. In other cases the ABS does not undertake the primary data collections. For example, in the case of the Energy and Greenhouse Gas Emission accounts (in development), the ABS reconfigures existing data from the energy balances compiled by the BREE, and emissions data collected by the DCCEE, to match with SEEA and SNA concepts.

ABS collections

23.211 Below is a very brief listing of current and proposed ABS environmental-economic accounts–their key features, followed by a table outlining expected timeframes for their future release.

- *Water Account, Australia* (cat. no. 4610.0) – includes physical flows of water supplied to, and used by, the economy, and water returns to the environment. The account also includes monetary supply and use tables and indicators of water productivity for industries.
- *Energy Account, Australia* (cat. no. 4604.0) – includes physical and monetary supply and use tables for various energy products by industry, including hybrid accounts i.e. accounts that present related data in both monetary and physical units. A time series of energy intensity measures by industry is also presented.
- *Land Account: Great Barrier Reef Region, Experimental Estimates, 2011* (cat. no. 4609.0.55.001) – pilot region includes physical and monetary land use by industry, land cover by industry and changes in land cover over time. In addition, land accounts potentially include terrestrial biodiversity and carbon.
- Waste account – to include physical generation and disposal of waste by industry, type of waste, and destination. Also to include monetary payments associated with these services.

23.212 Other types of accounts, such as those for emissions and material flows, EPE accounts, as well as the classification and valuation of natural resource assets will be addressed in a research agenda.

23.213 The following table provides a summary of current and planned ABS environmental-economic accounts and their periodicity for release.

Table 23.1 Summary of planned ABS environmental-economic accounts

| Theme | Reference period | Current status | Proposed status | Latest release |
|---|---|---|---|---|
| *Water Account, Australia* (cat. no. 4610.0) | 2010-11 | Annual | Annual | Sept 2012 |
| *Energy Account, Australia* (cat.no. 4604.0) | 2009-10 | Annual | Annual | Dec 2011 |
| Land Account | | Annual | Annual | Feb 2011 |
| Waste | | New | Annual | Feb 2013 |

Addressing public policy issues

23.214 There has been a significant amount of work done recently to provide data to inform the various public policy debates concerning the environment in Australia. The SEEA framework has been integral to this process and the results are outlined in the ABS publication *Completing the Picture – Environmental Accounting in Practice, May 2012* (cat. no. 4628.0.55.001).

23.215 *Completing the Picture – Environmental Accounting in Practice, May 2012* (cat. no. 4628.0.55.001) examines a number of complex issues facing policy makers in Australia, such as climate change and natural resource management, and illustrates how environmental-economic accounts can be used to further improve the decision-making process. It also includes a range of accounts that highlight the various interactions between the environment and economy.

# CHAPTER 24 QUALITY OF THE NATIONAL ACCOUNTS

## INTRODUCTION

24.1 'Quality' in relation to statistics is a multidimensional concept which embodies the notion of 'fitness for purpose'. In order to assist and encourage informed decision making, statistics need to be not only as accurate as possible, but also timely and relevant. There are often trade-offs between the various aspects of quality, and in order to make economic statistics timely enough to be relevant indicators for the analysis of current or recent economic conditions this is likely to be at the expense of some degree of accuracy. The ABS, in consultation with data users, aims to optimise the various aspects of quality.

24.2 The national accounts program is discussed against the seven quality dimensions of the ABS Data Quality Framework. These dimensions are a view of data quality aspects that determine fitness for purpose, and relate to the institutional environment, relevance, accuracy and reliability, timeliness, accessibility, interpretability and coherence. As well as informing users about quality, the framework also provides feedback to ongoing quality improvement programs within the ABS.

24.3 Underlying these dimensions of quality is the notion of integrity – that statistical policies and practices are guided by ethical standards and professional principles which are transparent. The integrity of the ABS is underpinned by legislation within which the organisation operates, and its willingness to subject its operations and performance to both internal and external scrutiny. The principle legislation determining the functions and responsibilities of the ABS are the *Australian Bureau of Statistics Act 1975* and the *Census and Statistics Act 1905*. These Acts provide that the ABS is headed by the Australian Statistician – a statutory office with an independent status and the authority to conduct statistical collections.

24.4 This chapter describes each of the aspects of quality, and assesses the national accounts against them. Compilation of the national accounts is a complex task involving many diverse data sources. It is not possible to provide a single, comprehensive measure of the quality of the estimates. Nonetheless, it is possible to gain an insight into their quality by analysing each of the aspects of quality. To obtain an overall picture, all aspects need to be considered together. However, different users may weight each of the aspects differently, and within each aspect what satisfies one user may not satisfy another. Thus, two users may look at the same set of statistics, with one considering them to be of good quality while the other may think that there are quality deficiencies.

## INSTITUTIONAL ENVIRONMENT

24.5 The institutional environment relates to the institutional and organisational factors which may have significant influence on the effectiveness and credibility of the agency producing the statistics. This is an important consideration as it enables an assessment of the context in which the statistics are produced and this may influence the validity, reliability or appropriateness of the product.

24.6 The ABS's mission is to assist and encourage informed decision making, research and discussion within governments and the community, by leading a high quality, objective and responsive national statistical service.

24.7 The legislative framework, organisational structure, planning and quality management practices of a statistical agency all affect the ability of a statistical program to meet user needs efficiently and effectively. The ABS operates within a framework that includes the *Australian Bureau of Statistics Act 1975* and the *Census and Statistics Act 1905*.

24.8 The *Census and Statistics Act 1905* provides the Australian Statistician, who heads the ABS, with the authority to conduct statistical collections and, when necessary, to direct a person to provide statistical information. The Act imposes obligations on the Statistician to publish and disseminate compilations and analyses of statistical information and to maintain the confidentiality of information collected under it.

24.9 To ensure the ABS' impartiality and independence from political influence, the *Australian Bureau of Statistics Act 1975* (the ABS Act) sets out the Australian Statistician's independence. The ABS Act requires the Australian Statistician to prepare an annual report on the operations of the ABS for presentation to Parliament. The ABS Act also establishes the Australian Statistical Advisory Council (ASAC). ASAC is the key advisory body to the ABS and provides valuable input to the directions and priorities of the ABS work program. The ABS is financed, via Parliamentary appropriations, for its administration and programs. Its

financial statements are audited annually by the Australian National Audit Office, and are published in the annual report. Together, these elements provide an environment conducive to the production of high quality national accounts and other statistics.

24.10 The ABS has an excellent reputation, both at home and abroad, for providing a statistical service of quality and integrity. A key reason for this reputation is that the ABS is willing to subject its operations and performance to both internal and external scrutiny. Some of the ways this is done is through:

- the advertisement of all scheduled release dates for publications up to twelve months in advance;
- the use of daily press and media releases to inform users of publications being released each day;
- the strict embargo policy, which is known to the public, that ensures impartiality for the release of all publications;
- the publication of the ABS three year Forward Work Program, which describes the ABS program, including the resources to be used, the outputs, the clients and the uses of statistical information, and the proposed developments over the next three years;
- the release of information about statistical standards, frameworks, concepts, sources and methods in a range of information papers and other publications; and
- the inclusion of details of major revisions to published data in the explanatory notes of the relevant publication.

24.11 The Australian national accounts has built a culture that focusses on quality, and emphasises objectivity and professionalism within the institutional environment of the ABS.

## RELEVANCE

24.12 Relevance relates to the degree to which statistical information meets the real needs of users. It involves client liaison, program review, priority setting and assuring that the statistics produced together with the underlying concepts conform with international statistical standards.

### Client liaison, priority review and program setting

24.13 The ABS regularly reviews all its statistical programs to ensure they remain relevant to user needs and to ensure capacity is available to provide information on new and emerging issues facing policy advisors and other data users. Each year relative priorities and competing resource requirements of all programs are formally and extensively considered by senior management, generally following consultation with users. The ABS maintains a three year forward work program which is rolled forward on an annual basis. Detailed work programs are developed, resources allocated and performance indicators are established for each statistical program including the national accounts.

24.14 Ensuring ABS national accounts outputs support decision making is achieved by extensive consultation with users. This happens in a variety of formal and informal fora:

- the Australian Statistics Advisory Council;
- the Economic Statistics User Group (ESUG);
- the State Accounts User Group (SAUG);
- the Input-Output User Group;
- the Productivity Measurement Reference Group;
- key client manager discussions;
- regular contact with the Commonwealth Treasury, state treasuries and the Reserve Bank of Australia, particularly through quarterly seminars and discussions;
- regular informal contact with other key users such as the Productivity Commission, particularly through their use of national accounts data; and
- ad-hoc meetings with academics and other experts.

24.15 While unmet demand for data is taken seriously, it does not mean that the ABS is currently in a position to move forward in all cases. The major area of unmet demand identified by users relates to the availability of state data, particularly quarterly GSP estimates, capital stock, multifactor productivity and the input-output

tables. Generally, state governments would like similar disaggregations by state that are available for Australia. At this stage the ABS has not been able to pursue their development on the grounds of cost and expected insufficient data quality.

24.16 The Economic Statistics User Group is the key forum for seeking user views on statistical issues, emerging data needs and priorities for the national accounts and other economic statistics. It meets regularly and the membership is drawn to provide a wide-ranging representation of the economic statistics user community.

## Concepts, definitions and classifications

24.17 An important aspect of quality is that the concepts, definitions and classifications used in the body of statistics are relevant to, and understood by, users and that in order to achieve this national accounts statistics need to be placed in an appropriate conceptual framework.

24.18 The framework used in the ABS in the compilation of national accounts statistics is based on the 2008 SNA. The various editions of the System have been developed over many years and involved the input of international organisations, national statistics agencies, academic experts and users of economic data. Moreover, it is designed as a set of accounts relevant to the analysis of economic issues. The System is reviewed and updated periodically in order to accommodate the changing structure of economies and contemporary economic issues.

24.19 The conceptual framework and estimation methodology for Australia's national accounts statistics are explained in *Australian System of National Accounts: Concepts, Sources and Methods* (cat. no. 5216.0) which is published annually in order to reflect changes in concepts, sources and methods that occur within the year. However, to keep users informed, these changes are also documented as they occur in the ABS quarterly and annual publications, *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) and *Australian System of National Accounts* (cat. no. 5204.0) respectively.

24.20 To ensure that the ASNA is relevant to domestic users, adaptations are made to the SNA framework to accommodate domestic perspectives, However, these are generally done in such a way that the ASNA remains comparable to those of other countries.

24.21 The ABS places great emphasis on ensuring that its economic classifications align with the 2008 SNA and other international standards to ensure comparability across its own economic collections and outputs as well as with those of other statistical organisations. Standard classifications are an essential element for the compilation and presentation of statistics produced by national statistical offices. Their use ensures that statistics are comparable across industry and sector boundaries and can be aggregated from various collections. Within the conceptual framework, the ABS attempts to make the statistics as useful as possible by classifying the data in a number of ways to meet user requirements.

24.22 The 2008 SNA recognises that the core frameworks and classifications will not meet all possible needs for economic accounts data. It therefore recognised the need for 'satellite accounts' that can be used to focus on particular areas of the economy in more detail or to allow different concepts or coverage while retaining a link back to the core national accounts system. The ABS has developed a number of satellite accounts in response to user demand and these are outlined in chapter 23.

24.23 For the national accounts statistics to remain as relevant as possible, resources are devoted to the research and development of new statistics. The outcomes of the research and development program are generally discussed with users and published in Information Papers prior to changes being implemented in the statistics.

24.24 The relevance of ABS national accounts statistics is also enhanced by the frequent inclusion of feature articles on topics of interest in the quarterly and annual national accounts releases. A full list of articles is included on the ABS web site and includes topics such as the impact of the drought, the relationship between GDP and employment, accounting for the environment in the national accounts, the underground economy and GDP, long term trends in industry structure of the Australian economy and income, saving and wealth. The series of feature articles are supplemented with the web-based publication *Spotlight on the National Accounts* (cat. no. 5202.0) which introduces specific national accounts topics to a general audience.

### Monitoring performance

24.25 Evidence that the processes described above are in place is provided by descriptions of the concepts, sources and methods as described in this publication. From the program perspective, evidence of periodic evaluation of the current relevance of each program can be provided and the impact of the results of these evaluations can be assessed.

24.26 Evidence of relevance is also provided by measures of usage, by client satisfaction results and by high profile examples of statistical information influencing or shedding light on important policy issues. Pointing out and publicising new analytical findings also demonstrates relevance.

24.27 The ABS maintains regular contact with key clients and other users of the national accounts to gauge their satisfaction with the services provided, including their views on the relevance of the data and priorities for future development. Information gleaned from these formal and informal contacts become input to the ABS priority setting processes, the outcomes of which are subject to high level management review processes.

## ACCURACY

24.28 For most users, accuracy is the most sought after attribute of data. Accuracy can be defined as the proximity of an estimate to some notional true value. Because the national accounts draw data from a wide variety of sources, reflecting varying valuations, coverage, frequency, detail and timeliness, it is not possible to produce an objective overall measure of accuracy of the accounts. Instead, assessments need to be made of individual component items within the accounts. Even at this level, the use of multiple data sources in estimating a single item, their variable accuracy over time and changing compilation methods complicate the picture. As a result, assessment of the accuracy of an item requires a high degree of subjective judgement based on knowledge of the sources, the data and the compilation methods used.

24.29 In considering the quality of national accounts statistics, it can also be useful to make a distinction between the concepts of accuracy and reliability. Accuracy is the proximity of an estimate to some notional true value while reliability is the proximity of initial and intermediate estimates for a particular period to the 'final' estimate for that period. A series which is never revised is reliable, but it may not be accurate. Although reliability can be objectively measured by an analysis of revisions, it is a relative term and users are likely to have some tolerance to revisions given the trade-offs with other characteristics of quality.

24.30 In practice, at least in Australia's national accounts, accuracy and reliability tend to be interwoven and reinforcing. Ideally, as the estimate for a particular period passes through a sequence of revisions, the size of revisions gets smaller (the statistics become more reliable) and the estimate moves closer to the true value (the statistics become more accurate), but in practice this may sometimes not be the case. Revisions can be reduced by delaying the release of statistics until all or most 'final' data sources are available, but this would mean that the statistics would be less relevant to users. ABS policy is to always aim for the most accurate estimate, even though this may be at the expense of more frequent revisions.

24.31 By being aware of the factors that influence accuracy, judgements can be made as to the extent of error likely to be associated with an estimate. Additionally, historical analyses of the revisions that the ABS makes to its estimates of GDP and its components can provide a quantitative guide to the reliability of the statistics produced.

### Factors affecting accuracy

24.32 The range of factors that can influence the accuracy of the national accounts, include:

- coverage deficiencies;
- input data errors, which include sample error and error due to the inability of data providers to report on the correct basis, mistakes in the reporting of data and error due to non-response;
- error introduced during the processing of data;
- methodological deficiencies; and
- output error due to inadequate editing and data confrontation.

### Coverage

24.33 The scope of the Australian national accounts is exhaustive within the production boundary recommended in the 2008 SNA, with the exception of illegal production. Illegal activity (which relates mainly to illicit drugs) is omitted from Australia's official statistics as it is difficult to measure with sufficient reliability.

24.34 As informal production is relatively unimportant in Australia, the ABS does not attempt to distinguish between the formal and informal sector in the sub-sectoring of the household sector. However, estimates are included for the value of owner-built construction activities and goods produced by households for own consumption such as food consumed on farms and home-grown fruit and vegetables. Unpaid housework including cooking and cleaning and volunteer services are not included, consistent with the recommendations of the 2008 SNA. However, estimates for these services have been prepared as satellite accounts and for more detail see Chapter 23.

24.35 Explicit upward adjustments are made to account for underground activity which is legal but is conducted in such a way as to avoid detection by taxation and other government authorities. The method used to obtain an estimation of underground activity was to systemically analyse each component of GDP and make judgements as to the maximum feasible level of underground activity given available evidence from the Australian Taxation Office and anecdotally. For more information see Appendix 6.

24.36 The scope of some data collections may be drawn more narrowly for cost or other reasons. For example, the scope may exclude non-employing businesses, business under a certain size or some industries. A narrower scope is more likely for monthly or quarterly surveys. Data from the taxation system and other data sources allows these gaps to be filled. The annual economic collections are designed around the availability of taxation data and the supplementation it brings to the coverage of small businesses including non-employing businesses. Non-profit institutions are generally income tax exempt, so data for them has to be collected by the ABS via the annual economic survey.

### Input data

24.37 The ABS undertakes a large number of collections that directly feed into the national accounts compilation process. National accounts requirements are a key consideration in the design of these surveys. Additionally, a range of non-ABS data, such as data from the taxation system, the financial institution regulation system and government financial reporting data are either integrated into the survey outputs or are used independently to compile the national accounts. As external data sources are beyond the control and responsibility of the ABS they can potentially have issues for quality assurance and measurement. This is often addressed by the ABS and the external source entering into explicit arrangements concerning roles and responsibilities of the respective agencies, questionnaire content and design, timely data and transference procedures, editing and querying protocols and appropriate feedback loops to the source agency.

24.38 The quality of ABS statistics is dependent on the application of good statistical methods during the selection and collection phases of a survey. The ABS puts substantial effort into developing standards in terms of classifications, concepts, data item definitions and question modules. All ABS surveys must use these standards. The collection instrument must be well tested and evaluated and this process is supported through documented standards in forms design and forms evaluation.

24.39 A high proportion of information used in compiling the Australian national accounts comes from surveys that use the ABS Business Register to provide the statistical frame from which representative samples are drawn. The ABS Business Register is based on the Australian Taxation Office's Australian Business Register (ABR) which contains all businesses that have an Australian Business Number (ABN). It is expected to be comprehensive because, with very limited exceptions, businesses are required by law to obtain an ABN. The ABS has adopted a strategy of building and maintaining its own records for large and complex businesses with information for the remaining businesses sourced from the ABR. Although the ABS Business Register is comprehensive and current, there are known to be some problems with the quality of the industry coding which would have implications for the quality of the data for individual industries used in the national accounts. There have also been some issues relating to institutional sector coding which the ABS is currently improving.

24.40 Sample design and estimation systems are developed by specialist areas in accordance with internationally accepted practices. Accuracy is considered in terms of both sampling and non-sampling error. The ABS publishes information on the RSEs for its various sample surveys. These can provide an indication of the accuracy of the national accounts components to which they relate. However, because of the transformations of survey data and the aggregations that are made in order to compile the national accounts,

it has not been possible to systematically calculate the impact that RSEs have on the various national accounting aggregates.

24.41 An important potential source of non-sampling error can result from the inability of some data providers to report on the correct basis. The data requirements underlying the national accounts are complex and, although every effort is made to match survey data items with business accounting practices, it is inevitable that some data providers will include in their survey responses items that should not be included, and exclude items that should be included. Survey forms are tested with a small number of providers before they are approved for use. Sophisticated techniques are used to edit provider responses, but errors can continue to go undetected. Data providers can make errors with regard to the content, timing and valuation of their transactions. Because the national accounts is a closed system, such errors can lead to inconsistencies, affecting the coherence of the accounts.

24.42 Although the ABS uses best practices in survey design and operation, given the data intensive needs of the national accounts system and the cost and respondent load imperatives that apply in survey design, it will often be the case that national accounts compilers have to make do with data that are of acceptable but less than ideal quality. This is more so for data at a finer level of detail where the standard errors are often higher. In some cases only limited detail might be collected or only collected infrequently (such as product details). Ensuring that the quality of input data is adequate to meet national accounts requirements remains an ongoing challenge. The national accounts process itself is designed to mitigate input data problems through data confrontation and balancing in the supply and use tables that are used to benchmark the national accounts. However, high quality input data are essential to high quality national accounts data.

24.43 The ABS periodically reviews its economic survey strategy to ensure that it meets needs within the constraints of resource availability. The national accounts requirements for data are regarded as of very high importance. The Business Statistics Innovation Program and the Annuals Integration Project are recent examples of wide-ranging reviews aimed at improving the targeting and quality of economic collections by the ABS.

### Methodology

24.44 The data sources and methods used in preparing ABS national accounts statistics are regularly reviewed and periodically changes are made to the basis of compilation of an item. A major methodological improvement to the Australian national accounts was the introduction of supply and use benchmarking and annually re-weighted volume estimates in 1998. The former results in greater coherence of the accounts and the latter provides a superior measure of economic growth to the previously available volume estimates based on 5 yearly reweighting.

24.45 Seasonal adjustment methods used by the ABS are based on the United States Bureau of the Census Method II Seasonal Adjustment program, X-11 variant. Traditionally, the national accounts seasonal factors were re-analysed each September quarter and factors were fixed for the rest of the year. From the September quarter 2006 issue of the national accounts, GDP and each of its components were concurrently adjusted for seasonality, although seasonal factors continue to be reviewed annually. This results in improved quality because the method is now more responsive to emerging changes in seasonal patterns.

### Output data

24.46 As the national accounts are compiled within a comprehensive framework, it is possible to reduce the impact of data errors through the confrontation of the various estimates in the national accounts. Data confrontation is built around the conceptual relationships that exist between data items. The best known data confrontation exercise is the compilation of the annual supply and use tables. In the compilation of these tables, estimates of the supply (production) and use (demand) for commodities are compared, with differences in the initial estimates being eliminated. At the same time estimates of the value of production are compared with estimates of incomes attributable to production and differences are eliminated (further details are included in chapter 8 on coherence of the national accounts).

24.47 Additional to this data confrontation exercise, each collection area is required to confront its data with other data held by the ABS and other organisations as an important part of the process of ensuring the coherence of ABS statistics. Clearance meetings are held for all the major economic collections used to compile the national accounts as a means of assuring data consistency between those collections and the national accounts, with emphasis on the most recent reference period.

24.48 The national accounts quarterly compilation process incorporates a review process designed to highlight inconsistencies and improbable data movements. Problems are identified, investigated and resolved in the process of finalising the GDP estimates. There is a feedback loop to the data collection areas, culminating in the clearance procedures mentioned above.

24.49 Over the past two years the ABS has developed quarterly supply and use (QSU) tables as an editing tool to assist in the preparation of the quarterly national accounts. Preliminary quarterly estimates for the production and income components are used as inputs to the model which generates estimates of product supply and use in a time series format. The QSU model enables inconsistencies between the different measures of GDP to be identified and investigated more systemically and at a greater level of detail than is possible by simply examining the aggregate estimates. At the present stage of its development, the QSU model is used as an aid in the compilation of the seasonally adjusted chain volume production and expenditure based estimates of GDP. The model may in the future be extended to incorporate current price estimates, including income based estimates. A description of the QSU model and how it is used is contained in the *Research Paper, A Supply and Use model for Editing the Quarterly National Accounts* (cat. no. 5258.0).

## Subjective accuracy ratings

24.50 Accuracy is concerned with the proximity of an estimate to the 'true' but unknown value of the component being measured. It is concerned with the degree of precision associated with the estimate. As already discussed, the complex nature of the national accounts makes it extremely difficult to produce a tangible benchmark against which to measure accuracy. Consequently the accuracy of the national accounts is in practice evaluated by considering the potential sources of error and considering whether they have been minimised to the greatest extent possible. One approach that can be used to tie all the information related to data quality together is to assign subjective accuracy ratings to each series.

24.51 Subjective accuracy ratings are not derived by a particularly rigorous process, but represent an intuitive assessment by national accounts compilers. A consensus was reached taking into account knowledge about the standard errors on key survey inputs, impressions about the coverage and reliability of administrative data sources and revisions to initial estimates of growth.

24.52 The next three tables contain an assessment for the initial quarterly estimates of movement for the current price and chain volume estimates of expenditure, income and production components of GDP. These have been chosen as they are generally the most anticipated of the national accounts estimates. Each component has been assigned one of the following grades:

A good
B fair
C poor
D very poor

Table 24.1 ACCURACY RATINGS—Expenditure components of GDP

| Component | Current price estimates | Chain volume estimates |
|---|---|---|
| Final consumption expenditure | | |
| Government | B | C |
| Household | A | A |
| *Total final consumption expenditure* | *A* | *A* |
| Private gross fixed capital formation | | |
| Dwellings | B | B |
| Ownership transfer costs | A | B |
| Non-dwelling construction | B | B |
| Machinery and equipment | B | B |
| Cultivated biological resources | C | C |
| Intellectual property products | C | C |
| *Total private gross fixed capital formation* | *B* | *B* |
| Public gross fixed capital formation | | |
| Public corporations | B | B |
| General government | B | B |
| *Total public gross fixed capital formation* | *B* | *B* |
| *Domestic final demand* | *A* | *A* |
| Changes in inventories | | |
| Private non-farm | C | C |
| Farm | D | D |
| Public authorities | C | C |
| *Gross national expenditure* | *A* | *A* |
| Exports of goods and services | A | A |
| Imports of goods and services | A | A |
| **GDP** | **A** | **A** |

Table 24.2 ACCURACY RATINGS—Income components of GDP

| Component | Current price estimates |
|---|---|
| Compensation of employees | A |
| Gross operating surplus | |
| Non-financial corporations | |
| Private | A |
| Public | B |
| *Total non-financial corporations* | *A* |
| Financial corporations | C |
| General government | A |
| Dwellings owned by persons | A |
| *Total gross operating surplus* | *A* |
| Gross mixed income | C |
| *Total factor income* | *A* |
| Taxes less subsidies on production and imports | A |
| **GDP** | **A** |

Table 24.3 ACCURACY RATINGS—Industry gross value added components of GDP

| | Component | Chain volume estimates |
|---|---|---|
| A | Agriculture, forestry and fishing | B |
| B | Mining | A |
| C | Manufacturing | B |
| D | Electricity, gas, water and waste services | A |
| E | Construction | B |
| F | Wholesale trade | B |
| G | Retail trade | A |
| H | Accommodation and food services | B |
| I | Transport, postal and warehousing | B |
| J | Information media and telecommunications | B |
| K | Financial and insurance services | C |
| L | Rental, hiring and real estate services | B |
| M | Professional, scientific and technical services | B |
| N | Administrative and support services | B |
| O | Public administration and safety | C |
| P | Education and training | C |
| Q | Health care and social assistance | C |
| R | Arts and recreation services | B |
| S | Other services | B |
| | Ownership of dwellings | A |
| | *Gross value added at basic prices* | *A* |
| | Taxes less subsidies on products | A |
| | **GDP** | **A** |

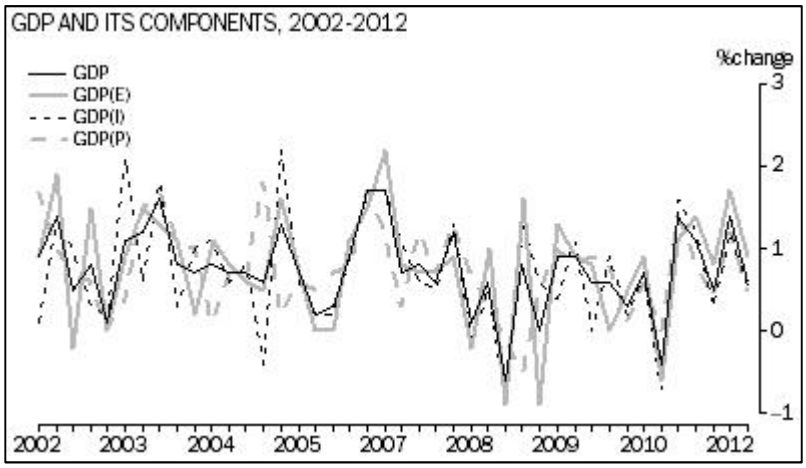
## Statistical discrepancies

24.53 A more objective but still limited indicator of accuracy is provided by examining the differences between the conceptually equivalent, expenditure, production and income estimates of GDP. Quarterly GDP in the Australian national accounts is derived as the average of the three measures, with accounting balance being achieved by an explicit statistical discrepancy item for each of the three elements.

24.54 The three measures of GDP up to the year prior to the most recent complete year (and latest two years in the June quarter release) are balanced in annual terms using the supply and use approach. This process eliminates the statistical discrepancies in annual terms, except for the latest year. The quarterly estimates of GDP are benchmarked to the annual estimates, but within-year inconsistencies remain.

24.55 Large and persistent statistical discrepancies relative to GDP can indicate gaps in the coverage of components or other quality issues. Because the components are balanced annually in a supply and use table, the magnitude of the quarterly statistical discrepancies is small relative to the level of GDP and they cancel out over the year. Any significant data coverage issues have been addressed over time. Of more interest in the Australian context is that quarter to quarter changes in the level of the statistical discrepancies are associated with minor or more significant inconsistencies between the growth rate of GDP and its conceptually equivalent components. For this analysis, it is not necessary to examine the statistical discrepancies at all. The coherence of the data is best seen by examining the growth rates of the three components and GDP.

24.56 The graph below shows the quarterly growth rates of GDP and its expenditure, production and income components.

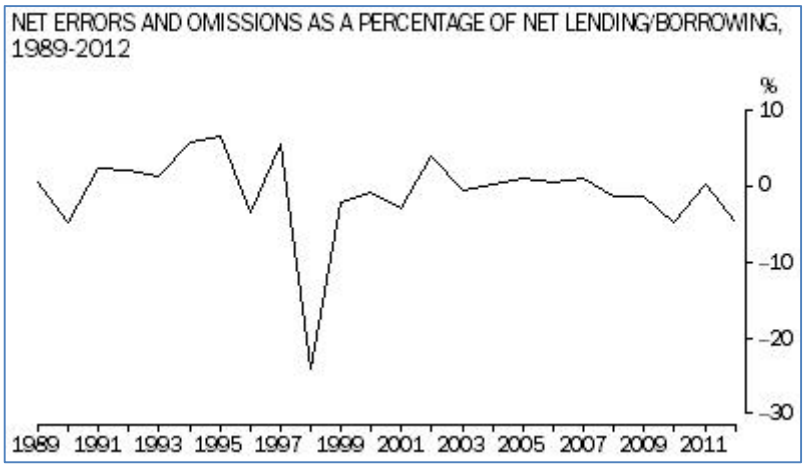



## Net errors and omissions

24.57 While the statistical discrepancies between the three measures of GDP provide one indicator of the accuracy of the national accounts, the net errors and omissions item in the financial account provides another. It represents the difference between the net lending derived in the capital account and the conceptually equivalent net lending item derived in the financial account – the net errors and omissions item is required to balance them.

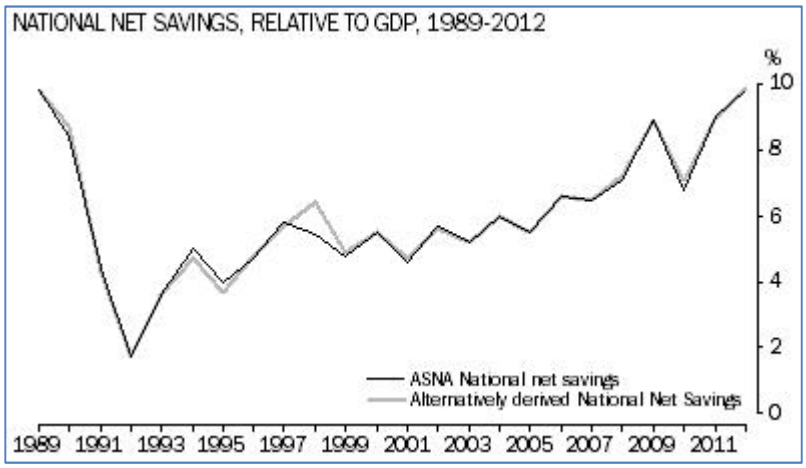
24.58 Net lending in the capital account is derived as a residual and reflects the expenditure, production and income components of GDP as well as other items such as net property income and net secondary income. The financial account also derives net lending as a residual but using totally independent data – it is the difference between the acquisition of financial assets and the incurrence of liabilities.

24.59 The graph below plots the net errors and omissions item in annual terms as a percentage of net lending for the nation. Some year to year differences are evident, reflecting the difficulties inherent in measuring residuals. It reflects timing and other errors in the estimation of income, expenditure and capital flows on the one hand and financial assets, liabilities and financial flows on the other.




24.60 The magnitude and volatility of the net errors and omissions item and the statistical discrepancy can also be used to indicate the quality of the saving estimates in the national accounts. National net saving is derived in the income and use of income accounts by deducting final consumption expenditure and consumption of fixed capital from gross disposable income. As it is a relatively small residual measure derived from very large aggregates its quality is particularly sensitive to inaccuracies in the series from which it is derived, and this needs to be borne in mind when using the data for analysis.

24.61 An alternative and largely independent measure of saving can be derived using acquisition of financial assets from the financial account as the starting point. Saving is a source of funds for both acquisition of financial assets and investment. The accounting relationships within the national accounts system mean that the alternative measure of saving can be calculated by deducting the net errors and omissions item and the statistical discrepancy between GDP(I) and GDP(E) from the official measure of saving. The graph below plots the official measure of annual saving and the alternative measure as a percentage of GDP. Although there are some year-to-year differences, the series track quite closely.




TIMELINESS

24.62 The timeliness of statistical information refers to the delay between the reference period to which the information pertains and the date on which the information is made available. The timeliness of information also influences its relevance. Obviously, users want data that are as contemporary as possible.

24.63 The source data used to compile the national accounts are available with varying degrees of timeliness, frequency, accuracy and detail. Successive vintages of source data are likely to be more accurate. This is consistent with the nature of business accounting systems where sub-annual data from management information systems are updated and eventually replaced by audited annual accounts.

24.64 The ABS aims to collect the various vintages of source data as soon as satisfactory results are typically available from the respondents' own systems. These may not be final data, and in some cases businesses may not be able to respond in accordance with the set deadlines at all, resulting in an expected level of non-response. Survey systems are designed to impute values for late or non-responders. A consequence is that initial estimates are likely to be revised.

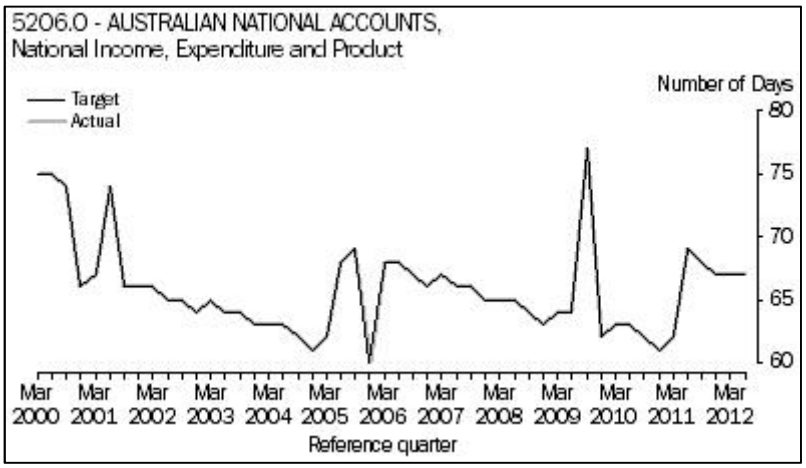
24.65 Therefore, there is an important trade-off between the accuracy and reliability of the estimates and the timeliness of their release. To meet the decision making needs of users there is pressure to produce statistics in as timely a fashion and as frequently as possible. To the extent that complete or accurate data may not be available with the desired timing or can only be obtained at unacceptably high resource costs if at all, there will be compromises with data accuracy. Both accuracy and timeliness are characteristics of quality – the ABS relies on feedback from users as to the optimal balance between them.

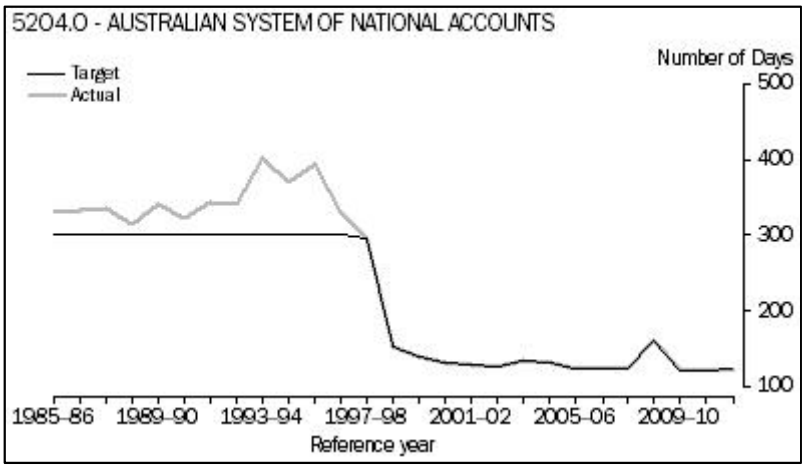
24.66 The trade-off between timeliness, accuracy and detail is accommodated by way of the sequencing of releases of national accounts publications. The first published quarterly estimates are usually made available about 60–70 days after the reference period. The detailed annual estimates are released between 4 and 5 months after the reference period. The most detailed national accounts estimates relating to production, income and expenditure are contained in the input-output tables, which typically become available about 38 months after the reference period. Australia's national accounts rate well against those of other countries in terms of their timeliness – particularly when the level of detail made available is taken into consideration.

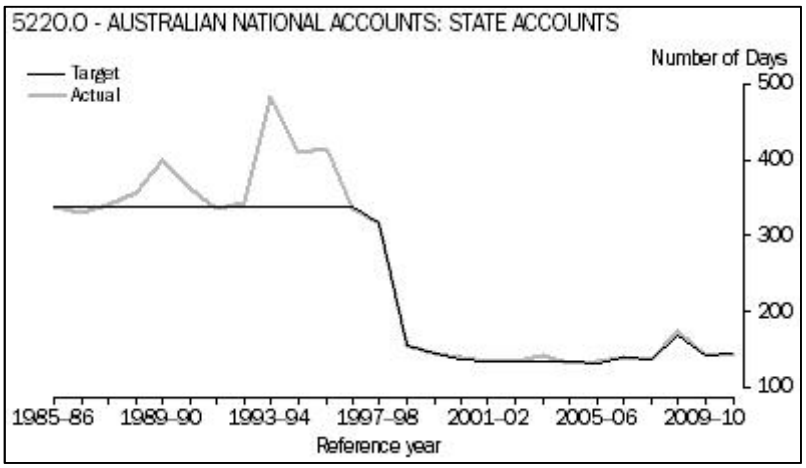
24.67 A number of countries, particularly those that release national accounts estimates early, release a preliminary issue of the quarterly national accounts followed by later 'final' estimates. The preliminary releases are often based on a partial view of the economy and require a certain amount of forecasting. For example, where monthly production indexes are available it is possible to base a preliminary estimate of quarterly production-based GDP (GDP(P)) on two months data and forecast the third month. This obviously improves the timeliness of the national accounts as they can be released soon after the end of the quarter, although

the preliminary releases are normally issued with caveats. The ABS has not chosen this approach, and monthly production indexes are not compiled that would enable this approach to be used.

24.68 The number of days between the end of the reference period and the release date is shown in the following graphs. Where the target line is not displayed, it is the same as the actual.






ACCESSIBILITY

24.69 Accessibility of information refers to the ease with which users can learn of its existence, locate it, and import it into their own working environment. Aspects covered include data availability, metadata availability (i.e. information about the data) and the degree of interpretative assistance available to users of the data. Data availability involves issues of data presentation, distribution media as well as the availability of non-confidential but unpublished data. Metadata availability concerns the availability of information concerning the concepts, sources and methods associated with the data. Accessibility also considers whether the information surrounding or supporting the data is openly available to the public.

24.70 Most aspects of accessibility in the ABS are determined by agency wide dissemination policies and delivery systems. At the program level, the main responsibility is to choose appropriate delivery systems and ensure that statistical products are properly included within corporate catalogue systems.

### Accessing the data

24.71 The ABS provides users with ready access to national accounts statistics. Paper publications have now largely given away to a variety of electronic releases which are now the preferred way of accessing statistical information. Everything on the ABS website is free of charge and this includes all standard releases of national accounts information.

24.72 A national accounts theme page on the ABS website lists all the quarterly and annual national accounts datasets currently available. It also provides an extensive range of national accounts information including access to the latest national accounts data. Key results are highlighted.

24.73 Information about the full range of national accounts and other ABS publications is available in the *Catalogue of Publications and Products* (cat. no. 1101.0).

24.74 Users requiring more detail than that provided in the standard national accounts releases can seek information on request and, subject to cost-recovery charges, the information will be provided if it is available and of sufficient quality.

### Accessing the metadata

24.75 The ABS has a range of ways of providing users with information about national accounts data. This publication (i.e. *Australian System of National Accounts: Concepts, Sources and Methods* (cat. no. 5216.0)) outlines the major concepts and definitions, describes the data sources and methods used to prepare the estimates and provides information about the ways in which the relevant international concepts and standards have been implemented in Australia. It also discusses the accuracy and reliability of national accounting concepts and estimates.

24.76 The front pages of each publication contain key results. Information is included about future releases and about any changes in the issue. Main features describe the major elements of the data, the tables and graphs contain footnotes to alert users to revisions and other relevant issues that impact the data series. The final

pages of both the quarterly and annual publications contain 'Explanatory Notes' and a 'Glossary' which describe in detail scope and coverage, data item definitions and classifications and comments on the accuracy of estimates.

### Information about releases

24.77 Release dates of national accounts publications are announced well in advance, both in the national accounts publications and in general ABS release advices. The ABS website also provides information about upcoming releases.

24.78 In releasing statistics, the ABS adheres to long established principles that results of statistical collections should be made available as soon as practicable and should be available to all users at the same time, although the ABS will consider giving very limited pre-release access for the purpose of briefing a Minister. An embargo is placed on the release of statistics until 11.30 am (Canberra time) on the designated day of release. There are strict security procedures to ensure that there is no unauthorised access of statistics prior to release.

### Consulting with users

24.79 Users are routinely consulted regarding their data requirements and how they would like to see the data presented in publications and electronic media. In response to various user comments, the quarterly publication *Australian National Accounts: National Income, Expenditure and Product* was redesigned in 2004 to better present key data items and to make the publication more user friendly.

### Assistance to users

24.80 In accordance with ABS policy, each national accounts publication contains an inquiries box on its front cover which provides contact details for either the National Information and Referral Service or the National Accounts Branch directly. The national information and referral service provides a free, quick reference information service to queries received from the community via telephone, email, letter and fax.

## INTERPRETABILITY

24.81 To make appropriate use of statistical information, users need to understand the properties of the information. That requires the provision of descriptions of the underlying concepts, variables and classifications that have been used, the methods of collection, processing and estimation used in producing the information and an assessment of the accuracy of the information.

24.82 Statistical information that users cannot understand, or can easily misunderstand, has no value and may have negative value. Providing sufficient information to allow users to properly interpret statistical information is therefore essential. Information about information is technically known as metadata. Managing interpretability is primarily concerned with the provision of metadata.

24.83 The information needed to understand statistical data falls under three broad headings:

- the concepts, definitions and classifications that underlie the data;
- the methodology used to collect and compile the data; and
- indicators of accuracy of the data.

The description of methodology also serves as a surrogate indicator of accuracy – it allows users to assess suitability for purpose.

24.84 There are close relationships between these three headings and other dimensions of quality. The underlying concepts and classifications used are also a prime determinant of coherence (see next section) and the degree to which they conform with national and international standards should be apparent from the metadata.

24.85 This publication defines and discusses the major concepts, definitions and classifications that underlie national accounts data estimates. It also describes the methodology used to transform input data into

statistical outputs and discusses the accuracy and reliability of national accounting estimates. The Australian national accounts concepts, classifications and terminology follow closely those of the SNA and therefore, users can be confident that they can draw valid comparisons with national accounts data produced by other countries.

24.86 Supplementing and updating this publication are an assortment of information papers, working papers and feature articles which draw attention to issues impacting on the data such as changes to the classifications, systems, concepts or standards, major data revisions and changes in data dissemination practices. Feature articles and technical notes are written on a regular basis to inform users of emerging issues and methodological changes and their impact on the national accounts. Most commonly, feature articles and technical notes are released in the national accounts publications, but *Australian Economic Indicators* (cat. no. 1350.0) has also been used. Information papers and research papers report on various aspects of research undertaken on topics relevant to the national accounts. A list of feature articles is maintained in the national accounts theme page on the ABS website.

## COHERENCE

24.87 Coherence of statistical data includes coherence between different data items pertaining to the same point in time, coherence between the same data item for different points in time, and international coherence.

24.88 By being aware of the factors that influence coherence, judgements can be made as to the extent of error that might be associated with an estimate. These judgements can be enhanced by comparing estimates that conceptually should be identical, or by comparing estimates where a particular relationship between the estimates could be expected. In other words, the extent to which a set of statistics are coherent can provide a guide to the accuracy of the statistics. However, it should be noted that a coherent set of statistics is not necessarily an accurate set, as the statistics that are being compared may suffer from similar magnitudes of error with the errors being in the same direction.

24.89 Users are sometimes faced with utilising different sets of statistical information derived from different sources and at different times. Appropriate use is facilitated if information can be validly compared with other related data sets. This is achieved through the use of common, or at least comparable, concepts and methodologies across products.

### Standard frameworks, concepts, variables and classifications

24.90 Frameworks, concepts and classifications exist to ensure that the target of measurement is consistent across statistical programs, that consistent terminology is used across programs and that the qualities being estimated bear known relationships to each other. The realisation of this element is normally through the adoption and use of frameworks such as the SNA and the ASNA. The issue of international comparability is addressed by considering the adherence of the standards adopted to the international standards as contained in the SNA.

24.91 Although there are a wide range of uses for economic data, national accounts data requirements are a key guiding principle behind most of the ABS's economic collections. Coherence has been aided by the harmonisation of the various international standards for economic statistics with the SNA. Where administrative data are used, special care is taken to ensure the correct application of standards and the identification of possible data gaps and overlaps. Where administrative data are known to differ from national accounts standards, appropriate adjustments are made to align the data.

### Common frames, methodologies and systems

24.92 The development and use of common frames, methodologies and systems for data collection and processing contribute to data coherence. For example, the use of a common business register across all business surveys ensures that differences in frame coverage do not introduce inconsistencies in data; the use of commonly formulated questions when the same variables are being collected in different surveys serves to minimise differences due to response error; the use of common methodology and systems for the various processing steps of a survey helps to ensure that these operations do not introduce discrepancies in data.

## Data comparison and integration

24.93 The confrontation of data from different sources and the subsequent reconciliation is a key part of the national accounts process. At its most formal, this process occurs in the annual balancing of the supply and use tables which are used to benchmark the national accounts. It also includes the coherence between the national accounts estimates and the various partial indicators of economic activity that are published by the ABS and outside (where applicable).

24.94 The confrontation of data in the annual supply and use framework provides a systematic, if somewhat complex, means of checking the coherence of much of the source data used in the national accounts. In the process the source data are subject to examination and adjustment to achieve coherence in the annual national accounts statistics. While coherence is achieved, it cannot be claimed that the results are necessarily accurate. Supply and use tables are data intensive and some product information has to be synthesised. Later and more suitable source data may become available that leads the national accounts compiler to take different decisions to balance the supply and use of products. The balancing process itself also has some limitations because it is not possible to thoroughly assess every imbalance. However, it can be expected that any significant inconsistencies in major data items will become apparent in the balancing process. Despite some limitations, the supply and use methodology is recognised internationally as the best means of checking the coherence of data and assuring the accuracy of the national accounts.

24.95 Although no attempt is made to completely balance quarterly data, considerable attention is given to confronting the consistency of the data used to compile the quarterly accounts. The ABS has developed a quarterly supply and use model to help identify internal inconsistencies and to help focus investigations by the national accounts compilers. However, timing and other inconsistencies in the data still remain after this process, and are reflected in the statistical discrepancies that are shown explicitly in the Australian national accounts. However, as previously mentioned, the statistical discrepancies are only a partial measure of coherence in the data – they represent an aggregation of all the positive and negative discrepancies implicit in the large amount of source data that are used to compile quarterly GDP.

24.96 The other aspect of coherence relates to the consistency of the national accounts with other economic data published by the ABS and other organisations. The ABS publishes a large amount of data on various aspects of the economy. To the extent that many of these are also inputs to the national accounts it could be expected that they would be coherent with the national accounts. Processes have been implemented to achieve as much consistency as possible. Representatives of the economic collections and economic accounts areas meet formally and regularly to discuss and come to agreement on the statistical treatment and dimensions of recent economic events such as privatisations, major construction and resource projects, asset purchases and other issues surrounding the reconciliation of economic data more generally.

24.97 A formal process has also been established to involve national accounts staff in the clearance of some quarterly economic indicator surveys that are published before the national accounts. This gives the national accountants an opportunity to ask questions and input any additional information gained from the wider perspective of other data available for the wider economy prior to finalisation of the results. As a result of this formal process the national accounts and the partial indicators data for recent quarters should be consistent, although some scope, concepts and other differences may mean that they are not exactly equal. As time goes by, the benchmarking procedures applied to the national accounts may lead to divergence with the sub-annual partial indicator statistics.

24.98 There have been a few occasions where officials and economic commentators have questioned the consistency between the national accounts and other economic data. In particular, the relationship between employment growth and output growth as measured by GDP is complex, and the data series can occasionally move in directions that appear counterintuitive. The ABS has undertaken an investigation into the relationship between GDP and employment, see the June 2005 release of *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) for more detail. The relationship between GDP growth and growth in tax revenues has also been raised. On this latter point, it should be noted that there are many differences between operating surplus from the national accounts and taxable income. For example, taxable income includes realised capital gains but deducts net interest payments. Operating surplus excludes capital gains and losses and does not deduct net interest payments. The treatment of these elements can result in different year to year movements and also in longer term growth patterns.

## QUALITY GATES

24.99 Quality gates link back to the ABS Data Quality Framework dimensions of institutional environment, relevance, timeliness, accuracy, coherence, interpretability and accessibility to ensure that all dimensions of quality have been considered and maintained in the production of the statistical outputs.

24.100 Quality gates reflect:

- the institutional environment through their implementation as a statistical risk mitigation strategy, so that the reputation of the organisation is protected;
- timeliness and relevance by ensuring that they are placed at appropriate junctures in the process where they can influence the direction and outcome of the quality of the process. For example: preventing delays by identifying problems in time, confirming that the process is okay at a given point in time in order to continue to the next steps, or confirming that the output requirements are achievable from the design of the inputs;
- accuracy and coherence through the use of quality measures and their corresponding tolerance levels;
- interpretability by encouraging documentation to ensure knowledge management and a shared understanding across all stakeholders of the quality gate and the underlying processes; and
- accessibility through the provision of information on the quality of the process at the individual components. In some cases the desired information, for example a particular quality measure, may not be available due to current reporting limitations in the processes, but is something that should still be acknowledged as a requirement for future development opportunities.

24.101 The national accounts have implemented several quality gates throughout the compilation process. Quality gates are applied as the source data is received and entered into the national accounts processing system to ensure its fit for purpose. Checks at this stage ensure the data set is complete, unusual movements are highlighted and revisions adhere to the revisions policy.

24.102 Quality gates are vital throughout the editing stage to ensure the data is being processed correctly. Checks at this stage ensure or highlight:

- additivity where applicable;
- correct application of benchmarks;
- missing and negative values;
- unusual movements; and
- acceptability of revisions.

24.103 Quality gates are also applied when analysing the data. They are useful to highlight inconsistencies and incoherence in the data.

## REVISIONS

24.104 Revisions in relation to the national accounts may be defined as the differences between a published sequence of estimates for a given reference period for the same national accounting variable over a particular period of time. Revisions arise from the progressive incorporation of more up to date data, re-weighting of chain volume series and reassessment of seasonal factors, and from time-to-time the introduction of new accounting concepts and improved data sources and methods.

24.105 Revisions analysis is concerned with the reliability of initial (or subsequent) estimates rather than the accuracy of estimates. Accuracy is always the main focus of statistical agencies. However, a standard accuracy measure, such as the standard error of GDP, has been found impossible to produce in practice because of the complicated compiling process and aggregation structure of the national accounts. For example, a Eurostat (1999) task force concluded that:

> "*even under the most optimistic assumption that confidence intervals can be provided for all basic sources, objective error margins for national accounts aggregates appear to be out of reach. The problems posed by identifying, measuring and aggregating all errors that remain after adjustments are made at the various compilation stages seem insurmountable.*"

24.106 Reliability refers to the ability of the successive vintages of national accounts estimates to present a consistent, reliable picture of the economy as the estimates are revised to incorporate increasingly comprehensive and improved source data. Therefore, reliability is a relative measure rather than an absolute measure. Revisions analysis is often employed as a diagnostic tool to indicate possible sources of unreliability, but the results should never to be used as an adjustment factor in compiling or interpreting the national accounts.

24.107 Revisions should not be seen as synonymous with error. Revisions are an inevitable consequence of the national accounts process, reflecting both the complexity of economic measurement and the need to provide economic policy advisers and other users with initial estimates that are timely in order to maximise their use in analysis of current economic conditions. While the trade-off between timeliness and accuracy/reliability is a major reasons for revisions to initial estimates, delaying the release of data by a year or more would not mean that revisions are no longer required. There are several reasons for this:

- unlike in business accounting, where the aim is to record accurately the transactions and financial position of a particular business entity in isolation, the national accounts process is aimed at bringing together sets of accounts that are coherent for the whole nation. It is in effect a quadruple accounting system, and achieving coherence between the transactions of economic agents is an iterative process proceeding over a number of years;
- some of the most complete data are only available every few years (such as the Census of Population and Housing);
- to make the national accounts more useful for economic analysis the data are subject to transformations to produce seasonally adjusted and trend estimates. The ABS uses X-11 methodology to estimate seasonal factors. This is essentially a model based process that relies on seasonal patterns established over a number of years and the estimation of forward (projecting) factors. As new quarters are added and previous quarters are revised the seasonal patterns and trend-cycle component (hereafter referred to as trend) are re-estimated and depending on specifications of the model can effect the estimates for a number of years. These estimations are subject to revision, particularly in real time as a result of so-called end-point problems that are endemic to filters used to estimate seasonal factors and trend; and
- where possible, improvements to data sources and estimation methods, as well as occasional changes to national accounting standards are backcast to earlier periods.

24.108 ABS and international data quality assessment frameworks include revisions history as one of the indicators of quality, linking it with the accuracy element. Users need to be aware of the potential for revisions, and to satisfy themselves that initial estimates provide an acceptable indication of later estimates that are based on more complete data that has been subjected to coherence checks within the national accounts system. As part of an overall quality assessment program, national accounts compilers are encouraged to regularly conduct an analysis of revisions in order to inform users and to help guide the continuous quality improvement process within statistics agencies.

24.109 The ABS has published studies of revisions in the past, as have a number of other national statistics agencies. However, more recently, the OECD have observed that most producers of economic statistics do not quantify revisions to their data. This has motivated them to establish the freely available 'Main Economic Indicators Original Release Data and Revisions Data Base' for a limited number of key economic statistics together with an analytical spreadsheet. This is designed to assist compilers of statistics and analysts to derive a standard set of revisions measures using either OECD data or their own data. This facilitates international comparisons of revisions.

24.110 The remainder of this section describes the national accounts compilation process and revisions policy, the development of an infrastructure for the regular analysis of revisions, and the results of a recent study into revisions to the quarterly national accounts.

### National accounts compilation process

24.111 The ABS has implemented a set of rules to manage the timing of revisions to the national accounts. These rules are based around the national accounts compilation process, which itself reflects the availability of new or revised source data as well as operational factors.

24.112 While the basic accounting and price index data from the quarterly surveys can normally be expected to become quite firm the quarter following the initial estimate, the national accounts process requires that the estimates derived from these sources be subject to annual benchmarking that proceeds on a regular basis. The results of the benchmarking process are first published in the September quarter issue of the quarterly

national accounts, coinciding with the availability of balanced annual current price and volume data from the supply and use tables.

24.113 The supply and use system progressively incorporates business accounts and other data from ABS annual surveys and from the taxation system. A balancing process is undertaken to achieve consistency between the supply and use of products in the economy in current price and volume terms. Data inconsistencies are reviewed and have to be resolved by altering some of the basic data. Quarterly national accounts estimates are benchmarked to successive vintages of annual data to maintain consistency within the national accounts system. This process also introduces revisions to quarterly growth rates in years either side of the new or revised annual data.

24.114 The benchmarking procedure used by the ABS is a mathematical routine designed to equate the quarterly and annual benchmarked estimates while minimising the impacts on existing quarterly growth rates. Using this procedure, revisions to an annual estimate have the potential to impact on growth rates for all the quarters in that year and in the two previous years and two forward years. Impacts of benchmarking on individual quarter growth rates could be reduced by adopting a simple pro rata procedure, but this would force all of the revision to growth rates into the September quarter. The optimising procedure used is widely considered to produce superior estimates of quarterly growth rates, but at the expense of more widespread revisions. Revisions to annual estimates result from the progressive incorporation of more complete source data balanced in the supply and use system and revisions to quarterly estimates result from the process of benchmarking. In this way a revisions process is inherent within the national accounts process because more comprehensive and reliable data only become available with a considerable lag.

24.115 Typically, the national accounts process for a given quarter for original current price and volume data proceeds as follows:

- the initial quarterly estimate is based on preliminary quarterly survey data;
- the later vintage quarterly estimates up to the June quarter issue of the national accounts are based on more complete or 'final' quarterly survey data;
- at the end of the current financial year (June quarter) the annual estimates for that year are derived initially as the sum of the four quarters;
- in the September quarter the reference year values for the whole time series of chain volume estimates are advanced one year to the current price values applying in the previous financial year. Re-referencing impacts data levels, but not growth rates. The base year weights for the current and previous year chain volume estimates are also moved forward. This can result in a revision to growth rates in those years; and
- in the September quarter the quarterly estimates are subject to a benchmarking process to align them with annual current price and volume data that has been balanced in the supply and use system.

24.116 Seasonally adjusted estimates are created by applying seasonal factors to the unadjusted/original current price and chain volume data. Trend estimates are obtained by removing the irregular component from the seasonally adjusted series. This transformation to seasonally adjusted and trend data is a modelling process where the addition of new quarters and data revisions to previous quarter's results in a re-estimation of the seasonal factors and underlying trends in the data going back a number of years due to the end-point problem. Revisions to growth rates will result from this process. Previously, seasonal reanalysis of the data series was traditionally undertaken each September quarter which meant that revisions to seasonal factors generally only occurred once a year, although on occasion a 'one-off' reanalysis was conducted if evidence of changing seasonality had emerged. However, the ABS introduced concurrent seasonal adjustment to GDP and its component series from the December 2006 quarter issue of the national accounts. This involves re-estimating seasonal factors for the whole time series with the addition of each new quarter and therefore, revisions potentially flow through with the addition of each new quarter. Overall, the use of concurrent seasonal adjustment improves the accuracy and the consistency of the seasonally adjusted series by reducing the reliance on outdated projected forward seasonal factors. Annual seasonal re-analysis is still required but it does not result in significant revisions to the seasonal factors that have been derived concurrently.

## Revisions policy

24.117 As a consequence of this process, in normal circumstances the following revisions policy applies for GDP and components.

24.118 The September quarter releases normally allow up to 16 quarters of revision (i.e. the quarters of the current year plus the quarters of the previous three financial years) for original current price and chain volume estimates. In these issues, updated annual supply and use benchmarks will be introduced.

24.119 In other quarter releases revisions to original current price (and chain volume) estimates are restricted to the current year and the previous financial year.

24.120 For chain volume and price measures, the annual re-referencing of the series each September quarter will cause revisions to the levels for the entire series. Re-referencing does not affect percentage movements, but the introduction of updated price weights for the most recent periods could affect growth rates for these periods.

24.121 Revisions resulting from seasonal re-analysis are allowed to flow through to the whole seasonally adjusted time series at the time the seasonal reanalysis is undertaken. Traditionally, this occurred in the September quarter release of the national accounts, but with the introduction of concurrent seasonal adjustment, revisions to seasonal factors now occur each quarter. GDP and all components were subject to concurrent seasonal adjustment from the September 2006 quarter issue of the national accounts onward.

24.122 From time to time the ABS will also implement an 'historical revision' outside of the normal cycle where the whole historical time series is opened up for revision. There has been a number of significant statistical developments in recent years (such as the implementation of the 2008 SNA and ANZSIC06) which has resulted in three historical revisions since 2008-09 (i.e. 2008-09, 2009-10 and 2010-11) and it is expected that 2012-13 will also be a historical revision.

## Availability of information on revisions

24.123 At present, the following indicative information is provided:

- *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) – Tables detail revisions to the recent eight quarters for GDP and its expenditure, income and industry components. Additionally, the publication contains commentary in the 'Analysis and comments' section on major sources of revisions and the 'Explanatory notes' provide some discussion of the sources of revisions and the accuracy of the estimates more generally;
- *Australian System of National Accounts* (cat. no. 5204.0) – The major sources of revisions are documented within the 'Analysis of results' section; and
- occasionally, more detailed studies have been made available.

24.124 Analysis of the revisions to the national accounts is undertaken regularly and the results are made available to users. This is in keeping with developing ABS' broader thinking about data quality declarations for statistical outputs.

## ABBREVIATIONS

| | |
|---|---|
| ABARES | Australian Bureau of Agricultural, Resource Economics and Sciences |
| ABN | Australian Business Number |
| ABR | Australian Business Register |
| ABS | Australian Bureau of Statistics |
| AIC | Annual Integrated Collection |
| ANA | Australian National Accounts: National Income and Expenditure |
| ANZSIC | Australian and New Zealand Standard Industrial Classification |
| ANZSIC06 | Australian and New Zealand Standard Industrial Classification 2006 |
| APM | Australian Property Monitors |
| APRA | Australian Prudential Regulatory Authority |
| ARIA | Australian Recording Industry Association |
| ASNA | Australian System of National Accounts |
| ASOM | Australian Students Overseas Model |
| ASX | Australian Stock Exchange |
| ATO | Australian Taxation Office |
| | |
| BACS | Building Activity Survey |
| BLS | Bureau of Labor Statistics |
| BOP | Balance of Payments |
| BPM5 | Balance of Payments and International Investment Position Manual, fifth edition |
| BPM6 | Balance of Payments and International Investment Position Manual, sixth edition |
| BREE | Bureau of Resources and Energy Economics |
| | |
| CBAs | Central Borrowing Authorities |
| CBCS | Commonwealth Bureau of Census and Statistics |
| CIF/FOB | Cost, Insurance and Freight/Free on Board Model |
| CIS | Construction Industry Survey |
| COE | Compensation of Employees |
| COFC | Consumption of Fixed Capital |
| COFOG | Classification of the Functions of Government |
| COICOP | Classification of Individual Consumption according to Purpose |
| COPNI | Classification of the Purposes of Non-Profit Institutions Serving Households |
| CPC, Ver. 2 | Central Product Classification, Version 2 |
| CPI | Consumer Price Index |
| CVM | Chain Volume Measures |
| | |
| DoHA | Department of Health and Ageing |
| DRET | Department of Resources, Energy and Tourism |
| | |
| EAS | Economic Activity Survey |
| ECS | Engineering Construction Survey |
| EDR | Economically Demonstrated Resources |
| EG | Enterprise Group |
| EN | Enterprise |
| ESAA | Electricity Supply Association of Australia |

| | |
|---|---|
| Eurostat | Commission of the European Communities |
| FIFO | First in first out |
| FISIM | Financial Intermediation Services Indirectly Measured |
| f.o.b. | free on board |
| FSAM | Foreign Students in Australia Model |
| GDP | Gross Domestic Product |
| GDP(E) | Gross Domestic Product – Expenditure approach |
| GDP(I) | Gross Domestic Product – Income approach |
| GDP(P) | Gross Domestic Product – Production approach |
| GFCE | Government Final Consumption Expenditure |
| GFCF | Gross Fixed Capital Formation |
| GFS | Government Finance Statistics |
| GFSM | International Monetary Fund's Government Finance Statistics Manual |
| GG | General Government |
| GMI | Gross Mixed Income |
| GNDI | Gross National Disposable Income |
| GNI | Gross National Income |
| GOS | Gross Operating Surplus |
| GPC | General Purpose Classification |
| GSP | Gross State Product |
| GSP(P) | Gross State Product - Production Approach |
| GST | Goods and Services Tax |
| GVA | Gross Value Added |
| HECS | Higher Education Contribution Scheme |
| HELP | Higher Education Loan Program |
| HES | Household Expenditure Survey |
| HFCE | Household Final Consumption Expenditure |
| ICT | Information and Communication Technology |
| ILO | International Labour Organisation |
| IMF | International Monetary Fund |
| IMTS | International Merchandise trade Statistics |
| I-O | Input-Output |
| IOIC | Input-Output Industry Classification |
| IOPC | Input-Output Product Classification |
| IPD | Implicit Price Deflator |
| ISC | Insurance Service Charge |
| ISIC, Rev 4 | International Standard Industrial Classification of All Economic Activities, Revision 4 |
| IVA | Inventory Valuation Adjustment |
| JPDA | Joint Petroleum Development Area |
| LE | Legal entity |
| LFS | Labour Force Survey |
| LGPC | Local Government Purpose Classification |

| | |
|---|---|
| LIFO | Last in first out |
| MMFS | Manual of Monetary and Financial Statistics |
| MPDAA | Motion Picture Distributors Association of Australia |
| n.e.c. | not elsewhere classified |
| NEO | Net Expenditure Overseas |
| n.i.e. | not included elsewhere |
| NNI | Net National Income |
| NPI | Non-Profit Institution |
| NPISH | Non-Profit Institutions Serving Households |
| NPV | Net Present Value |
| OCV | Other changes in volumes |
| OECD | Organisation for Economic Co-operation and Development |
| OTC | Ownership Transfer Costs |
| PHIAC | Private Health Insurance Administration Council |
| PIK | Payments in kind |
| PIM | Perpetual Inventory Model |
| PPI | Producer Price Index |
| PVA | Production Valuation Adjustment |
| QBIS | Quarterly Business Indicators Survey |
| R&D | Research and Development |
| RBA | Reserve Bank of Australia |
| REIA | Real Estate Institute of Australia |
| RIS | Retail Industry Survey |
| RIS/WIS | Retail Industry Survey/Wholesale Industry Survey |
| SDRs | Special Drawing Rights |
| SEASABS | Seasonal analysis to ABS standards |
| SEE | Survey of Employment and Earnings |
| SEEA | System of Integrated Environmental and Economic Accounting |
| SESCA | Standard Economic Sector Classifications of Australia |
| SIH | Survey of Income and Housing |
| SISCA | Standard Institutional Sector Classification of Australia |
| SITC | Standard International Trade Classification |
| SITE | Survey of International Transport Enterprises |
| SITS | Survey of International Trade in Services |
| SMLC | Survey of Major Labour Costs |
| SMVU | Survey of Motor Vehicle Use |
| 1968 SNA | System of National Accounts, 1968 |
| 1993 SNA | System of National Accounts, 1993 |
| 2008 SNA | System of National Accounts, 2008 |
| S-U | Supply and Use |
| SUIC | Supply Use Industry Classification |

| | |
|---|---|
| SUPC | Supply Use Product Classification |
| TARM | Travel by Australian Residents Model |
| TAU | Type of Activity Unit |
| TFRM | Travel by Foreign Residents Model |
| TNTS | The New Tax System |
| TRS | Tourist Refund Scheme |
| UN | United Nations |
| VACP | Value of Agricultural Commodities Produced |
| VFACTS | Federal Chamber of Automotive industries Vehicle Facts |
| WET | Wine Equalisation Tax |
| WPI | Wage Price Index |
| WST | Wholesale Sales Tax |

# APPENDIX 1 CLASSIFICATIONS

## INTRODUCTION

A1.1 Standard classifications and definitions of statistical units and items are essential elements underlying the compilation and presentation of statistics produced by national statistical offices, such as the Australian Bureau of Statistics. The use of such standards ensures that statistics are comparable across industry and sector boundaries and can be aggregated from various collections, e.g. for national accounts purposes.

A1.2 Furthermore, the ABS has adopted the System of National Accounts 2008 (2008 SNA) as the standard for the compilation of its national accounts statistics, to help promote the integration of economic and related statistics, as an analytical tool, and in the international reporting of comparable national accounting data.

## SECTOR CLASSIFICATIONS

A1.3 Dividing the economy into sectors provides information about groups of economic units, such as financial corporations or households, that have similar economic functions and institutional characteristics. The main purpose of these classifications is to facilitate analysis of economic activity along sectoral or institutional lines. The Standard Economic Sector Classifications of Australia (SESCA) describes a number of standard classifications used by the ABS in the compilation of statistics that involve dividing the economy into broad economic sectors.

A1.4 A key classification within SESCA is the Standard Institutional Sector Classification of Australia (SISCA). SISCA is based on the 2008 SNA institutional sector classification. The ASNA bases its sector classification on the international standards set out in 2008 SNA. In the ASNA there are five sectors:

- non-financial corporations (including public non-financial corporations);
- financial corporations;
- households (including unincorporated enterprises and NPISHs);
- general government; and
- rest of the world.

A1.5 The 2008 SNA delineates an extra sector for non-profit institutions serving households (NPISHs), but these units are included with the household sector in the ASNA.

A1.6 The main feature for both the non-financial corporations and financial corporations sectors is that they cover businesses which are legally, or clearly act as, entities separate from their owners with regard to their economic activities. Businesses mainly classified to these sectors include companies registered under the Companies Act or other Acts of Parliament, or large unincorporated enterprises which maintain complete and independent financial records.

A1.7 The non-financial corporations sector comprises all resident corporations and quasi-corporations mainly engaged in the production of market goods and/or non-financial services. Also included are non-profit institutions (NPIs) that mainly engage in market production of goods and non-financial services. These NPIs include those set up by associations of non-financial corporations to mainly provide member corporations with services, for which the members pay directly or by way of regular membership fees.

A1.8 Public non-financial corporations include government owned or controlled enterprises which are mainly engaged in the production of goods and services for sale in the market with the intention of substantially covering their costs.

A1.9 Financial corporations are mainly engaged in both incurring liabilities and acquiring financial assets, i.e. in borrowing and lending money, in financial leasing or investing in financial assets. Corporations providing services closely related to and designed to facilitate these activities are also classified to this sector, e.g. the Reserve Bank of Australia is included in the financial corporations sector.

A1.10 Households and unincorporated enterprises are included in the one sector because the owners of ordinary partnerships and sole proprietorships frequently combine their business and personal transactions. Non-profit institutions serving households (NPISHs) comprise all resident non-market NPIs that are not

controlled and not mainly financed by government. Such NPIs provide goods and services to households free or at prices that are not economically significant.

A1.11 The general government sector includes all departments, offices and other bodies mainly engaged in the production of goods and services for consumption by governments and the general public, whose costs of production are mainly financed from public revenues. NPIs which are mainly financed and controlled by governments are included in this sector.

A1.12 The rest of the world sector encompasses non-resident governments, businesses and persons that engage in transactions with Australian residents. It includes only non-resident units that enter into or have other economic links with Australian resident units. Therefore, non-resident units are excluded from all other sectors.

A1.13 Further information on the classification of institutional sectors generally in ABS statistics is contained in *Standard Economic Sector Classifications of Australia, 2008* (cat. no. 1218.0). This publication describes a number of standard classifications used by the ABS in the compilation of statistics that involve dividing the national economy into broad economic sectors.

### FUNCTIONAL CLASSIFICATION

A1.14 The 2008 SNA proposes 'functional' classifications to identify the 'functions'—in the sense of 'purposes' or 'objectives'—for which groups of transactors engage in certain transactions.

A1.15 Four functional classifications are included in the 2008 SNA. Of these only the Classification of Individual Consumption according to Purpose (COICOP) is used. The 1993 SNA version of the Classification of the Functions of Government (COFOG) is the basis of the General Purpose Classification (GPC) and Local Government Purpose Classification (LGPC) used in the ASNA. The GPC and LGPC align with the COFOG at the highest level but there are differences at the lower level.

A1.16 The two that are not used are the Classification of the Purposes of Non-Profit Institutions Serving Households (COPNI) and the Classification of Outlays of Producers by Purpose (COPP).

A1.17 COICOP is used to classify individual consumption expenditures in the Household final consumption expenditure aggregate (HFCE). Individual consumption expenditures are defined as those which are made for the benefit of individual persons or households. COICOP groups together goods and services that serve similar functions.

A1.18 In the ASNA the classification of HFCE is aligned, as far as possible, with COICOP. However, there are some instances where it is not yet possible for Australia to follow COICOP's recommendations, e.g. Australia does not include an estimate of HFCE on narcotics or prostitution services (classified in COICOP item 02 Alcoholic beverages, tobacco and narcotics and item 12.1 Personal care respectively). Reliable data on narcotics and prostitution expenditure are currently unavailable. The functional categories of HFCE are based on COICOP and modified for Australian circumstances in the ASNA. The categories include:

- Food;
- Alcoholic beverages and tobacco;
- Clothing and footwear;
- Housing, water, electricity, gas, and other fuels;
- Furnishings, household equipment and routine household maintenance;
- Health;
- Transport;
- Communications;
- Recreation and culture;
- Education services;
- Restaurants and hotels; and
- Miscellaneous goods and services.

A1.19 Transactions that are associated with non-profit institutions serving households, which are included in the household sector, are currently aligned to the COICOP functional classification.

A1.20 COFOG is the classification proposed by the 2008 SNA for the functions of government. It is designed for classifying current transactions (such as consumption expenditure, subsidies and current transfers), capital outlays (capital formation and capital transfers) and acquisition of financial assets by general government and its subsectors.

A1.21 Government final consumption expenditure (GFCE) is current expenditure by general government bodies on services to the community such as defence, education, and public order and safety. In the ASNA, the classification of GFCE is aligned with the 1993 SNA COFOG rather than the 2008 SNA. The categories used in the ASNA classification of total outlays are as follows:

- General public services;
- Defence affairs and services;
- Public order and safety affairs;
- Education affairs and services;
- Health affairs and services;
- Social security and welfare affairs and services;
- Housing and community amenity affairs and services;
- Recreational, cultural and religious affairs and services;
- Fuel and energy affairs and services;
- Agriculture, forestry, fishing and hunting affairs and services;
- Mining and mineral resource affairs and services, other than fuels; manufacturing affairs and services; and construction affairs and services;
- Transportation and communication affairs and services;
- Other economic affairs and services; and
- Expenditures not classified by major group.

A1.22 "Chapter 29 Section B. Functional classifications" in the 2008 SNA describes in greater detail the principles and uses of these classifications. Further detail is contained in *Classifications of Expenditure According to Purpose* (United Nations, 2000).

## INDUSTRY CLASSIFICATION

A1.23 The industry classification employed throughout the ASNA is based on the *Australian and New Zealand Standard Industrial Classification, 2006 (ANZSIC)* (cat. no. 1292.0). ANZSIC identifies groupings of businesses which carry out similar economic activities. Each such grouping defines an industry, and the similar economic activities which characterise the businesses concerned are referred to as activities primary to that industry.

A1.24 The ANZSIC structure comprises categories at four levels, namely Divisions (the broadest level), Subdivisions, Groups and Classes (the finest level). At the divisional level ANZSIC provides a broad overall picture of the economy, and hence it is suitable for publication in summary tables in official statistics. The subdivision, group and class levels provide increasingly detailed dissections of the broad categories.

A1.25 In the ASNA, ANZSIC is employed with the single modification being that ownership of dwellings is treated as a separate industry. Industry detail is generally provided at the Division level. In preparing the accounts it is sometimes necessary to shorten some of the more lengthy ANZSIC Division title descriptions. Where this occurs, no change in industry definition or content is implied.

A1.26 The industry classifications used for S-U tables and I-O tables—Supply-Use Industrial Classification (SUIC) and Input-Output Industrial Group (IOIG)—are also based on ANZSIC, but in some respects they depart from the usual application of that classification. For I-O tables it is desirable that an industry corresponds as closely as possible to the production of products primary to that industry. This applies especially where units classified to an industry produce significant amounts of products primary to another industry which has quite a different pattern of inputs. In these cases, where practical, secondary or subsidiary production is treated as output of the industry to which production is primary; this process is called redefinition of production.

A1.27 Redefinitions of production were included in the I-O tables up until 1996-97 and they can be found in the ABS publication *Input-Output Tables, 1996–97* (ABS cat. no. 5209.0). After 1996-97, redefinitions are no longer included in the I-O tables.

## PRODUCT CLASSIFICATION

A1.28 The product classifications employed in the ASNA are the Supply-Use Product Classification (SUPC) and Input-Output Product Classification (IOPC). The S-U and I-O systems describe the production and subsequent use of all goods and services in the economy, hence the SUPC and IOPC are defined in terms of the characteristic products of industry.

A1.29 The structure of the SUPC and IOPC arises from their industry-of-origin basis. In an industry-of-origin classification, each product item is shown according to the industry in which it is primarily produced. Thus the structure of the SUPC and IOPC consists of industry of origin headings with detailed product items shown under each heading.

A1.30 The overall principles for the preparation of such an industry-of-origin product classification are:

- homogeneity of inputs—each product or product group should consist of items that have similar input structures or technology of production. This principle is generally applied through the definition of each SUPC and IOPC item in terms of the ANZSIC industry sector in which it is mainly produced; and
- homogeneity of disposition—each product or product group, having satisfied the first criterion, should consist of items that have similar patterns of disposition or usage. This principle is applied by reference to the description of source data items and information about the transport, distribution and product taxation margins applying to particular products.

A1.31 This structure is implemented in the SUPC and IOPC by the adoption of ANZSIC classes as the basis for defining SUPC and IOPC items. In the Input-Output tables each IOPC item is identified by an eight digit code with the first four digits indicating the ANZSIC class to which the item is primary and the last four digits indicating the product number within the ANZSIC industry-of-origin class.

A1.32 At its most detailed level the IOPC comprises approximately 1,200 individual product items. For a full description of the nature, purpose and principles underlying this classification see *Australian National Accounts: Input-Output Tables (Product Details)* (cat. no. 5215.0).

## ASSET CLASSIFICATION

A1.33 The 2008 SNA describes three types of assets that should be included in the national accounts:

1. Non-financial produced assets;
2. Non-financial non-produced assets; and
3. Financial assets (and liabilities).

A1.34 Non-financial produced assets are defined as non-financial assets that have come into existence as outputs from processes that fall within the production boundary of the 2008 SNA. Produced assets need not be goods only. The 2008 SNA classifies mineral exploration expenditure, research and development, computer software and the value of produced entertainment, literary or artistic originals also under the heading of produced assets. Such assets were previously described as intangible but they are now referred to as intellectual property products.

A1.35 There are two main types of produced assets: fixed assets and inventories. Both fixed assets and inventories are assets that are held only by producers for purposes of production.

A1.36 Fixed assets are defined as produced assets that are themselves used repeatedly, or continuously, in processes of production for greater than one year. The distinguishing feature of a fixed asset is not that it is durable in some physical sense, but that it may be used repeatedly or continuously in production over a long period of time, taken to be more than one year. Some goods, such as coal, may be highly durable physically but cannot be fixed assets because they can be used once only. Fixed assets include not only structures, machinery and equipment, but also cultivated assets such as trees or animals that are used repeatedly or continuously to produce other products such as fruit or dairy products. They also include assets such as research and development, computer software or artistic originals used in production.

- Inventories consist of:
    - stocks of outputs that are still held by the units that produced them prior to them being further processed, sold, delivered to other units or used in other ways; and
    - stocks of products acquired from other units that are intended to be used for intermediate consumption or for resale without further processing.

A1.37 Inventories are held either as finished goods, work-in-progress or raw materials.

A1.38 Non-financial non-produced assets are defined as non-financial assets that have come into existence in ways other than through processes of production. This group includes among other things, land, water, subsoil assets and native forests. Also included are transferable contracts and purchased goodwill. At present, there are insufficient data to include estimates of water, purchased goodwill and transferable contracts in non-financial non-produced assets in the ASNA, the exception being spectrum licences which is included.

A1.39 Financial assets (and liabilities) differ from other assets in the national accounts in that, when a financial asset is owned by an institutional unit, there is (with the exception of SDRs) a counterpart liability on the part of another institutional unit. Financial assets include monetary gold, special drawing rights (SDRs) on the International Monetary Fund, cash and deposits, securities other than shares, loans and placements, shares and other equity, and other accounts receivable/payable.

A1.40 Chapters 10 "The capital account" and 11 "The financial account" and Annex 1 "The classification hierarchies of the SNA and associated codes" in the 2008 SNA describe in greater detail the classification of assets and liabilities in the national accounts.

# APPENDIX 2 DIFFERENCES BETWEEN ASNA AND 2008 SNA

## INTRODUCTION

A2.1 As mentioned previously, the ABS endorses the revised SNA and has implemented its recommendations to the fullest extent practicable. However, there are a number of 2008 SNA recommendations/treatments relating to concepts, the production boundary and presentation that the ABS does not plan to implement or is not currently in a position to implement because of inadequate data. These are described below.

## NON-PROFIT INSTITUTIONS SERVING HOUSEHOLDS SECTOR

A2.2 The SNA recommendations are adhered to with regard to the sectoral allocation of NPIs that are market producers and those that are controlled and mainly financed by government units. In principle the ABS has agreed to identify and implement the NPISH sector. However, due to source data limitations, it will be some time before a complete set of accounts for this sector can be developed, including the provision of an adequate time series. In the interim, NPISHs are included in the household sector.

## NON-MONEY MARKET INVESTMENT FUNDS

A2.3 The 2008 SNA includes all non-money market investment funds in the financial corporations sector. However, the ABS considers that non-money market investors that invest mainly in non-financial assets should be included in the non-financial corporations sector and referred to as non-financial investment funds. Non-financial investment funds mainly invest in real estate.

A2.4 Non-money market investment funds that invest mainly in financial assets are classified to the financial corporations sector. They are referred to as non-money market financial investment funds.

## HOLDING COMPANIES

A2.5 The 2008 SNA indicates that holding companies (a unit which holds the assets of subsidiary corporations but does not undertake any management activities) receive the sectoral classification of captive financial institutions and money lenders. This treatment would result in the creation of additional enterprises in situations where currently there are no financial intermediary enterprises in the group. The ASNA treatment for holding companies in the financial accounts and balance sheets is that they receive a sector classification that reflects the major economic activities of the controlled entities. The ASNA treatment is a departure from the 2008 SNA.

## DEFINITION OF BASIC PRICES

A2.6 The 2008 SNA reaffirms the 1993 SNA treatment of basic prices. Analysts who use I-O tables however, have expressed a strong preference for the 1968 SNA definition of basic prices. The 1993 SNA altered the definition of basic prices with regard to the treatment of transport margins, so that transport which is not separately invoiced is included in the basic price, while that which is separately invoiced is not included in the basic price of the product being transported. This was a change from the 1968 SNA definition of basic price which excluded the transport component whether separately invoiced or not.

A2.7 The ABS considers that the 1968 SNA definition provides more useful statistics for detailed analysis of the economy and has implemented this in the I-O tables. This results only in changes to estimates of output and intermediate consumption by industry for series at basic prices, with no impact on gross value added or GDP series at purchasers' prices.

### IDENTIFICATION OF MARKET AND NON-MARKET TRANSACTIONS

A2.8 The 2008 SNA makes a distinction between market and non-market output in the measurement of production. The latter includes services provided by general government, housing services produced for own consumption by owner occupiers, and own-account capital formation. The ABS does not explicitly make this distinction in either the national income, expenditure and production accounts or the I-O tables. However, some major components of non-market output are available separately in the ASNA such as government final consumption expenditure and imputed rent of ownership of dwellings.

### CONSOLIDATION – INCOME ACCOUNT, FINANCIAL ACCOUNT AND FINANCIAL BALANCE SHEETS

A2.9 The sectoral and total economy, for the income account, financial account and financial balance sheets, are produced on a consolidated basis in the ASNA. The 2008 SNA recommends unconsolidated compilation of these accounts. The ASNA does not believe this practice produces analytically meaningful estimates and in some cases may be misleading as they contain double-counting. For example, within the financial accounts and balance sheets, financial resources of the sector (or subsectors) will be overstated, as will liabilities. From an analytical perspective, the increase in assets and liabilities of the banking system for example by counting an interbank deposit as both an asset and liability of the banking sector is money moving through the financial system without an economic impact. Similarly, increasing household income and expenditure by the same amounts through measuring inter-household income transfers are not analytically useful in the macroeconomic context.

### ILLEGAL ACTIVITIES

A2.10 The 2008 SNA recommends that, in principle, all economic transactions associated with illegal activities should be included in the accounts. While current estimates in the ASNA do not include any specific estimates for such activities, some transactions arising from them are likely to be included in the data sources used to compile the accounts. For example, some income earned from illegal gambling or prostitution activities may be reported as unincorporated business income in the taxation statistics.

### CROPS – TIME OF RECORDING IN OUTPUT AND GDP

A2.11 The 2008 SNA recommends that cultivated natural growth be included in output as work-in-progress or gross fixed capital formation over the entire period of the growth process. This recommendation covers growth of agricultural crops, livestock, cultivated fish and crustaceans, vineyards, orchards and timber tracts. In the 1968 SNA, only growth in livestock and fishstock were treated in this way, although the recommended treatment was not adopted in the ASNA. The existing ASNA treatment is to include crops and forest products in output when harvested, but to follow the 2008 SNA recommendations for major categories of livestock (i.e. beef and dairy cattle and sheep).

A2.12 The recommendations for crops and forest products have not been implemented for data availability and operational reasons. Implicitly this means crops have no economic value until harvested. Implementation of the 2008 SNA treatment for crops would require crop output to be forecast at the beginning of the crop year and then distributed to quarters as crop growth occurs. Because the crop year generally spans more than one financial year in Australia, it would also require a redistribution of output across years. Given Australia's variable weather conditions, which can give rise to downgrading or destruction of crops prior to harvest, as well as variations in prices for agricultural commodities, revisions to the previous year could be substantial if the 2008 SNA approach were to be adopted. A further difficulty is that measurement of the crop production process throughout the season would be quite arbitrary, given the amount of growth allocated to quarters will differ from crop to crop, from year to year, and from region to region. The major expenses associated with wheat production would be incurred in the June (planting) and December and March (harvesting) quarters, although substantial crop growth would also occur during the September quarter. Notwithstanding the somewhat arbitrary nature of the recommended allocator, quarterly costs data by type of crop are not available.

A2.13 The approach taken to the treatment of crop output in the accounts can have a significant impact on year-to-year growth, especially in a year following the breaking of, or coming into, a drought. In the quarterly accounts, the choice of seasonal adjustment method is of major importance to the interpretation of the data. Because crop output is almost exclusively in the December and the March quarters, it is difficult to seasonally adjust in the standard manner. Instead of the standard multiplicative time series model, where the seasonal and residual components are both directly proportional to each other and to the trend, a pseudo-additive

model is used, where the relationship with the trend is preserved but seasonal and residual components are no longer proportionally related to each other. This allows for an adequate seasonal adjustment to be made of time series data, such as crop output, where regular null quarterly estimates are observed in the original time series. This method of seasonal adjustment is applied to aggregate cereal crops (wheat, barley, other cereals), to other crops such as sugar cane and fodder and grass, and to wheat marketing costs in both current price and volume terms.

### REPAIRS AND MAINTENANCE OF DWELLINGS

A2.14 The SNA 2008 recommends that purchases of materials used for minor repairs and maintenance (i.e. do-it-yourself activities of decoration and minor repairs), which are normally the responsibility of the tenant, should be treated as household final consumption expenditure for both owner-occupiers and renters. The ASNA deviates from this recommendation and treats all repairs and maintenance on dwellings as intermediate consumption of the Ownership of dwellings industry.

### SPECULATIVE CONSTRUCTION – TIMING OF RECORDING IN GROSS FIXED CAPITAL FORMATION

A2.15 The 2008 SNA recommends that speculative construction be shown as part of inventories until the ownership has been transferred to the eventual user of the asset. Hence work done on speculative construction would not be treated as gross fixed capital formation until that time. The value of output would remain as part of the work-in-progress of the institutional unit producing the asset until sold. However, construction for own use or work completed under contract of sale should be included as gross fixed capital formation as the work is put in place. The ASNA currently adopts the latter treatment for all building and construction activity, including speculative construction.

A2.16 The ABS has decided to retain the existing approach in the ASNA for operational reasons and because the ASNA treatment is not regarded as a significant departure from the intentions of the 2008 SNA. It would be difficult to collect the data needed to implement the 2008 SNA treatment in the ABS Building Activity Survey, which is the major source of data on the value of new buildings for the national accounts. In particular, the nature of the survey would have to change from a 'work done' basis to an 'inventories' basis for speculative building projects. Information about individual speculative building projects would need to be collected until the building was sold. It is considered that the gains in adopting the 2008 SNA treatment of speculative construction are minimal and not worth the extra burden on respondents, especially as there would be no impact on the measurement of GDP. Moreover, speculative activity is only important at certain times in the building cycle and as dwellings are generally completed over one or two quarters, any timing adjustment to investment and capital stock would be relatively insignificant. There were also objections to this treatment during the user consultations which were conducted prior to the implementation of the 1993 SNA in the ASNA.

### SICK LEAVE, TERMINATION AND REDUNDANCY PAYMENTS

A2.17 The 2008 SNA recommends that severance, termination and redundancy payments by employers; sick leave payments; and payments for other forms of leave other than annual leave and long service leave be classified as employers' social contributions. However, in Australia, data providers are unable to consistently differentiate between these various types of severance and leave payments, and other wage and salary payments. Therefore these payments are included in the ASNA estimates of wages and salaries.

### SUPERANNUATION CONTRIBUTIONS AND BENEFITS IN THE HOUSEHOLD INCOME ACCOUNT

A2.18 In the ASNA, employers' contributions to superannuation funds (a component of compensation of employees), and interest received on householders' equity in life insurance and pension funds, are recorded as household income and contribute to disposable income and saving. Contributions to and drawdowns from superannuation reserves are treated as financial transactions by households and do not impact on income or saving. In addition, contributions placed with financial institutions managing superannuation funds are not treated as income of the financial institutions, neither are payments of benefits from the funds regarded as disbursements of income from the financial institutions. Rather, the contributions made to the schemes and the benefits paid by them, represent changes in the equity of households in the schemes and are reflected instead in the financial accounts and balance sheets.

A2.19 The 2008 SNA continues this conceptual treatment in so far as it affects household saving. However, in contrast to the ASNA practice, the 2008 SNA recommends that some additional transactions on account of

superannuation should be included in households' secondary income receivable and payable, in order to make explicit the underlying economic processes taking place. Actual receipts of benefits would be shown as receipts of secondary income by households. Similarly, contributions by households to superannuation schemes (both the employers' and employees' components, including property income attributable to householders' equity) would be shown as secondary income payable. Therefore, the 2008 SNA treatment alters the measure of household disposable income. However, in order to maintain the conceptual integrity of the system, the additional transactions need to be reversed, by including the item 'Adjustment for change in net equity of households on life insurance and pension funds' so as to leave household saving unaffected. The ABS has not implemented the 2008 SNA treatment in the ASNA, because it is considered to be too confusing for users of the accounts.

### OWNERSHIP TRANSFER COSTS (OTCS) – SEPARTELY IDENTIFIED

A2.20 The 2008 SNA includes OTCs in the values of dwellings and non-dwelling construction and a separate series for OTCs on non-produced assets (excluding land as these are included with land improvements, a component of non-dwelling construction). The ASNA however, records all OTCs as a separate item.

A2.21 OTCs in the ASNA relate to dwellings, non-dwelling construction, and unoccupied land.

### DATABASES

A2.22 The ASNA does not separately identify databases from computer software. The valuation treatment in ASNA is consistent with the 2008 SNA treatment. However it is not clear that the entire scope of database production, particularly the updating of databases, is being captured in practice. Further work is being undertaken to ensure the activity is measured completely.

### VALUABLES – INCLUSION WITHIN THE FIXED ASSET BOUNDARY

A2.23 The 1993 SNA introduced a new produced non-financial asset, namely, valuables. Valuables are defined as goods of considerable value that are not used primarily for purposes of production or consumption, but are held as stores of value over time. The economic benefits that valuables bring are that their values are not expected to decline relative to the general price level. For Australia, the most important of these assets is gold. While this 1993 SNA and 2008 SNA treatment is supported in principle, existing and prospective data availability is a major problem. It has not been possible to implement this treatment in the ASNA at this stage, although further investigations will be undertaken. In the ASNA, that part of gold production which is retained as a store of value will contribute to the item 'changes in inventories' rather than to an item for 'valuables'.

### PURCHASED GOODWILL AND MARKETING ASSETS – INCLUSION WITHIN THE ASSET BOUNDARY

A2.24 Purchased goodwill and marketing assets are classified as non-produced assets. However, due to data limitations these are not included in ASNA.

### CONTRACTS, LEASES AND LICENCES – INCLUSION WITHIN THE ASSET BOUNDARY

A2.25 Contracts, leases and licences includes marketable operating leases, permits to use natural resources, permits to undertake specific activities and entitlement to future goods and services on an exclusive basis. The ASNA includes permits to use natural resources only and the item included is spectrum licences.

### MONETARY GOLD

A2.26 The 2008 SNA definition of monetary gold is gold to which the monetary authority has title and is held as reserve assets. All monetary gold is included in reserve assets or is held by international financial organisations, and is treated as a financial asset even though the holders do not have a claim on other designated units.

A2.27 The ASNA treatment of monetary gold departs slightly from the treatment outlined in the 2008 SNA in that a liability of the rest of the world is imputed. The reason for not adopting the 2008 SNA treatment is to

preserve consistency with the international investment position (IIP) for Australia within the financial accounts. The IIP according to BPM6 permits recording of assets in the form of monetary gold as assets of the domestic economy (i.e. external claims). In re-presenting external claims data in a 2008 SNA framework, the major presentation is to show cross-border positions as assets and liabilities of the rest of world. Thus the external assets of BPM6 are represented as foreign liabilities, and external liabilities are represented as foreign assets, in the financial accounts. The IIP (external assets less external liabilities) of BPM6 should be derivable from the rest of world accounts in the ASNA, i.e. foreign liabilities less foreign assets. Omitting monetary gold from liability positions of the rest of the world will not produce this result. This treatment in ASNA has been adopted mainly to minimise confusion among the users of the statistics.

### REPURCHASE AGREEMENTS

A2.28 A repurchase agreement (repo) involves the sale of securities or other assets with a commitment to repurchase equivalent assets at a specified date. The buyer may on-sell these securities to another party. Both the 1993 SNA and BPM5 treated repos as collateralised loans, or as other deposits if repos involve liabilities classified under national measures of broad money. After considering whether the 1993 SNA treatment should be revised to treat repos as security trades rather than loans, the international community decided that 2008 SNA would continue the 1993 SNA treatment (collateralised loan) and the issue would be placed on the international long-term research agenda.

A2.29 The collateralised loan treatment is not supported by the ABS. The ABS maintains that the best statistical representation of a repo is that of a sale of securities, with the obligation to sell/buy-back similar securities recorded as a forward contract (i.e. a form of derivative). This treatment has the advantage of unduplicated recording of securities assets whereas the collateralised loan approach (2008 SNA) requires recording of negative security assets to maintain equality between total securities' asset holdings and total securities' liabilities on issue. The ABS treatment will impact on compositional aspects (e.g. securities versus loans, classification of asset holders) but will have no impact on analytical aggregates (net assets, net lending/borrowing).

### RECORDING INTEREST ON DEBT SECURITIES

A2.30 The 1993 SNA and BPM5 did not deal explicitly with the situation of changing interest rates and the measurement of income flows on tradable securities. There are two schools of thought on this topic. The debtor approach records the interest accruing at the contractual rate agreed at the time of issue of the security. The creditor approach records the interest accruing at the current market interest rate. Proponents of the debtor approach argue that it records the legal liability of the debtor to the creditor. Proponents of the creditor approach argue that it is consistent with the market valuation principle. The 2008 SNA and BPM6 recommend the debtor approach be applied for recording interest accruing on debt securities. This approach leads to complications when interest rates change after the date of issue of variable interest rate instruments.

A2.31 The ABS applies the creditor approach as the best reflection of the market reality in terms of valuing the underlying instrument and the interest that accrues over the life of the instrument. The ABS will maintain consistency throughout the accounts by applying the creditor approach for debt securities.

### VALUATION OF LOANS AND PLACEMENTS

A2.32 Financial institutions make a general provision for loan losses based on known characteristics of the loan portfolio and its performance over time. Because the provision is general, the specific loan contracts and the counterpart liabilities incurred are not identifiable, making it conceptually difficult to record such a provision in the 2008 SNA accounting structure. By contrast, specific provisions for impairment arising from poor performance (non-performing) of an individual loan contract are more certain as to likely occurrence and counterparty identification.

A2.33 The 2008 SNA recommends valuation of loans in the balance sheet at nominal value, with non-performing loans identified and two memorandum items concerning them included in the balance sheet of the creditor. The first is the nominal value of the loans so designated, including any accrued interest and service charges. The second is the market equivalent value of these loans.

A2.34 The ABS considers that, in order to maintain consistency regarding the valuation of all financial instruments, market valuation of loans or a close approximate should be recorded. The ASNA takes into account specific loan loss provisions in valuing loan portfolios and their counterparts and as a result the closest

approximation to market value or fair value is recorded in the ASNA. The ASNA does not take account of general loan loss provisions. Valuation of loans at nominal values is produced in supplementary tables in the ASNA.

### ECONOMICALLY DEMONSTRATED RESOURCES

A2.35 The SNA 2008 defines subsoil assets as *proven* subsoil resources of coal, oil and natural gas, metallic minerals or non-metallic minerals that are economically exploitable given current technology and relative prices. In the ASNA, the volume of subsoil assets available for production is more accurately reflected by the term 'economically demonstrated resources' (EDR), which equates to *proven plus probable* resources. EDRs are those resources that have a very high probability of existence and are economically feasible to extract, given current technology and relative prices.

### RECORDING OF EMISSIONS REDUCTION SCHEMES

A2.36 Emissions permits are unique policy instruments designed to achieve specific economic and environmental objectives. They have some properties of the broad category of contracts, leases and licences and share certain characteristics with other types of permits issues by governments. The discussion of emissions trading schemes in the 2008 SNA was found to be inadequate in the face of rapid development of schemes internationally.

A2.37 As a result, the international statistical community, through the United Nations Statistical Commission (UNSC), made a decision on treatment of greenhouse gas emission reduction schemes in February 2012 which effectively updates the 2008 SNA. In arriving at this decision, there was significant disagreement over valuation and timing of recognition of elements of such schemes that involve a market trading component, such as cap and trade schemes.

A2.38 The international statistical community ratified a treatment based on a historic cost approach. The ABS disagreed with the UNSC decision, considering that the endorsed treatment will distort the impact of such schemes on both government and business statistics as represented in the national accounts. Accordingly, the ABS consulted with stakeholders about the implications of deviating from recommended international standards in respect of this case, and as a result has decided to apply fundamental market valuation principles to such schemes.

A2.39 For further information, see *Information Paper: Recording Emissions Reduction Schemes in ABS Statistics* (cat. no. 5257.0.55.001).

### PRESENTATION OF THE ACCOUNTS IN ASNA

A2.40 The main differences between the ASNA and the 2008 SNA presentation of accounts include:

1. The ASNA GDP account is presented as three separate accounts reflecting each measure of gross domestic product, that is expenditure, production (i.e. gross value added) and income (i.e. 2008 SNA account for generation of income).

2. The ASNA income accounts are a combination of the 2008 SNA accounts for allocation of primary income, secondary distribution of income, and use of income.

3. The 2008 SNA's Other changes in volume of assets account and Revaluation account are not presented as separate accounts, rather the details contained in these accounts are presented as part of ASNA's Balance sheets.

4. The Non-profit institutions serving households sector is not separately identified. It is combined with the Households sector.

A2.41 There are also minor differences in the way information is presented within the accounts and in the level of detail shown. For example, the separate identification of ownership transfer costs and not separately identifying databases from computer software.

## APPENDIX 3 LINKS BETWEEN BUSINESS ACCOUNTS AND NATIONAL ACCOUNTS

A3.1 The gross domestic product account represents a consolidation of the trading accounts of individual enterprises. An enterprise engaged in trading (whether in production in the narrow sense, in distribution, or in the provision of other services), will have a 'production or trading account' which in simplified form will be something like the following:

Table A3.1 PRODUCTION ACCOUNT OF A TRADING ENTERPRISE

| | *$'000* | | *$'000* |
|---|---|---|---|
| Opening inventories | 20 | Sales | 210 |
| Wages and salaries | 100 | Subsidies | 2 |
| Current purchases | 50 | Closing inventories | 25 |
| Taxes on production and imports | 15 | | |
| Gross operating surplus | 52 | | |
| | 237 | | 237 |

The two sides balance, the balancing item being gross operating surplus.

A3.2 This account can be simply rearranged to show the 'gross product' of the enterprise, i.e. its contribution to gross domestic product. In rearranging the account, subsidies are offset against taxes on production and imports. An enterprise may regard a subsidy as little different from sales proceeds. However, in the national accounts, subsidies are regarded as transfer payments from general government which enable enterprises to sell their output for less than would otherwise be the case. In this respect, they are exactly opposite in their effect to production taxes. The inventories entries are rearranged. Instead of 'opening inventories' and 'closing inventories', the entries are combined to become 'changes in (the value of) inventories' (during the accounting period). Each side now adds up to the total turnover of the business (additions to inventories being treated as turnover for this purpose). The 'gross product' of the enterprise is the sum of wages and salaries paid, the gross operating surplus and taxes less subsidies on production and imports, and can be written in as a subtotal. Rearranged, the account now shows the following:

Table A3.2 PRODUCTION ACCOUNT OF A TRADING ENTERPRISE – ALTERNATIVE FORM

| | *$'000* | | *$'000* |
|---|---|---|---|
| Wages and salaries | 100 | Sales | 210 |
| Taxes less subsidies on production and imports | 13 | | |
| Gross operating surplus | 52 | Closing inventories | 5 |
| Gross product | 165 | | |
| Current purchases | 50 | | |
| | 215 | | 215 |

A3.3 A production account in the same form can be drawn up for a financial enterprise, although financial enterprises present a special problem (discussed in paragraph A3.13 below). The following results are illustrative of production accounts in this form being consolidated for all enterprises. Current purchases by enterprises from other enterprises (i.e. purchases other than for capital purposes), which appear as both current purchases and sales, cancel out on both sides, and purchases from overseas (imports of goods and services) remain on the left side. On the right side, the only sales left are export sales, sales to buyers other than enterprises (i.e. to consumers and general government) and sales to enterprises for capital purposes (i.e. purchases by these enterprises which are not currently charged to their production accounts).

A3.4

Table A3.3 CONSOLIDATED PRODUCTION ACCOUNT OF ALL TRADING AND FINANCIAL ENTERPRISES

| | $m | | $m |
|---|---|---|---|
| Wages and salaries | 150 | Sales to: | |
| Gross operating surplus | 50 | Consumers | 174 |
| Taxes less subsidies on production and imports | 25 | General government (current) | 5 |
| Gross product | 225 | General government (capital) | 5 |
| Current purchase from general government | 1 | Enterprises for capital purposes | 45 |
| Imports of goods and services | 40 | Overseas (i.e. exports of goods and services) | 35 |
| | | Changes in inventories | 2 |
| Total turnover | 266 | Total turnover | 266 |

A3.5 The next stage in developing a production account for the whole economy is to add a production account for general government. (Public enterprises like railways, Australia Post, electricity and water supply undertakings, and government banks, are not included in general government because they are regarded as enterprises.)

A3.6 The 'production account' for general government would be on the following lines:

Table A3.4 PRODUCTION ACCOUNT FOR GENERAL GOVERNMENT

| | $m | | $m |
|---|---|---|---|
| Wages and salaries | 40 | Charges made for services to: | |
| Current purchases from enterprises | 5 | Consumers | 2 |
| Imports of goods and services | 1 | Enterprises | 1 |
| Consumption of fixed capital | 5 | Balance | 48 |
| | 51 | | 51 |

A3.7 If general government were treated in the same way as enterprises, the 'balance' would have to be considered a gross operating loss. The reason is that the payments for wages and salaries and other purchases by general government bodies considerably exceed the small amounts they receive by charging for their services (e.g. charges made by government schools for sales or hire of text books). Their major source of income is from income taxation, and this does not appear in their production accounts.

A3.8 The 'output' of general government is not measured, for national accounting purposes, by the charges it makes for its services. Instead, it is valued, by convention, according to the cost of supplying the services, i.e. the total of the items on the left side of the above account (which, of course, is equal to the total of the items on the right side). In effect, general government as a producer is regarded, apart from the minor charges to other sectors, as producing goods and services for 'sale' (at net cost) to a general government income account for final use by general government. The item called 'balance' in the above table is therefore renamed 'government final consumption expenditure'.

A3.9 This 'production account' for general government can now be consolidated with that for enterprises. Current purchases from enterprises and charges made to enterprises cancel out with the corresponding items in the enterprise production account. Imports of goods and services become the total for the whole economy. The remaining wages and salaries to be added are those paid by persons (to domestic servants, etc.), and those paid by non-profit organisations, whose activities are here included with those of persons. If these wages and salaries are added to the left side and the value of the equivalent services to persons are added to the right side (as a form of 'production account' for these activities), total wages and salaries for the whole economy are now shown on the left side. On the right side, instead of 'sales to consumers', the appropriate entry is 'household final consumption expenditure' (including the cost of domestic services and the expenses of non-profit organisations).

A3.10 With these changes, and some renaming, the consolidated production account for enterprises can be presented as a consolidated production account for the whole economy:

Table A3.5 CONSLIDATED PRODUCTION ACCOUNT FOR THE WHOLE ECONOMY

| | *$m* | | *$m* |
|---|---|---|---|
| Wages and salaries | 195 | Household final consumption expenditure | 181 |
| Gross operating surplus | 55 | General government final consumption expenditure | 48 |
| Taxes less subsidies on production and imports | 25 | Gross fixed capital formation by enterprises | 45 |
| | | Gross fixed capital formation by general government | 5 |
| | | Changes in inventories | 2 |
| | | Gross national expenditure | 281 |
| | | Exports of goods and services | 35 |
| | | *less* Imports of goods and services | *41* |
| Gross domestic product | 275 | Gross domestic product | 275 |

A3.11 The derivation of many of the items in this account is quite obvious as they are simply carried down from one of the two preceding production accounts. However, the derivation of some aggregates is more complicated. Such cases are elaborated below:

| | |
|---|---|
| Wages and salaries ($195m) = | Enterprises ($150m) + General government ($40m) + Persons and NPISH ($5m) |
| Gross operating surplus ($55m) = | Enterprises ($50m) + General government consumption of fixed capital ($5m) |
| Household final consumption expenditure ($181m) = | Enterprises sales ($174m) + General government sales ($2m) + Persons and NPISH ($5m) |

A3.12 In effect, this account is the same as the gross domestic product measured by the income and expenditure approaches shown in the Australian national accounts. It should be noted, however, that the changes in the value of inventories as calculated from existing business accounting records do not fulfil the requirements of national accounting. For national accounting purposes, physical changes in inventories should be valued at the prices current at the time the changes occur. Where the value so derived differs from that obtained from business accounting records, an 'inventory valuation adjustment' equal to the difference between the change in 'book' value of inventories and the value of physical changes at current prices should be applied. This adjustment has to be deducted from gross operating surplus, and consequently from gross domestic product, if these are estimated in the first instance from sources consistent with 'book' values.

A3.13 In gross domestic product measured by income approach the item above for wages and salaries is replaced by the term 'compensation of employees', which includes wages and salaries, employer contributions to superannuation and workers' compensation premiums. In addition, gross operating surplus for unincorporated trading enterprises is renamed 'gross mixed income', in recognition of the fact that the income accruing to the owners of unincorporated businesses includes a return to labour as well as a return to capital. Gross fixed capital formation is shown separately for private and public enterprises.

A3.14 In the above discussion, financial enterprises were treated in precisely the same way as trading enterprises, but it was mentioned that they present a special problem. Financial enterprises are businesses mainly engaged in financial transactions in the market consisting of borrowing and lending, providing insurance or providing financial auxiliary services. Their main source of income is either a margin between interest received and interest paid or a margin between insurance premiums and the related claims. Their payments

for wages and salaries and other purchases typically exceed the small amounts they receive as separate charges for their services (e.g. charges by banks for keeping current accounts or clearing cheques). If these separate charges are treated as the only charges they make for their services, the production account would show a gross operating loss. Results comparable with those for other enterprises are obtained by acknowledging that certain receipts of financial enterprises include a service charge element, and by including this in the calculation of their gross operating surplus. In effect, but with some qualifications, the service charge element is estimated on the basis of valuing the output of financial enterprises at cost plus a profit component. In the case of non-life and life insurance and superannuation, part of the premiums is treated as an insurance service charge. (The service charge is also included in the purchases of the recipients of the services.) In the case of other financial enterprises such as banks, credit unions and finance companies, the interest paid by borrowers can be regarded as comprising two components: a service charge and a 'pure' interest flow. Likewise, the interest paid to depositors can be viewed as a 'pure' interest flow from which a service charge has been deducted. The total imputed service charge is the sum of the imputed service charges for both borrowers and depositors.

# APPENDIX 4 CHANGES IN THIS EDITION

## INTRODUCTION

A4.1 The following table outlines the changes that have been made in this edition of the *Australian System of National Accounts: Concepts, Sources and Methods* (cat. no.5216.0).

Table A4.1 Summary of changes made

| Item | Change made | Table/paragraph number |
|---|---|---|
| Iron ore mining quarterly GVA | Quarterly GVA for ANZSIC class 0801 Iron ore mining is now separately identified. | Table 9.41 |
| Education and training quarterly GVA | Quarterly indicators for education and training have been introduced to estimate GVA. Previously a linear trend interpolation of the annual estimate was used. | Table 9.69 |
| Mining inventories | Mining inventories is now separately identified. | Tables 10.52 and 10.55 |
| Consumer durables | Composition of consumer durables has changed to align with the definition of household durables in the 2008 SNA Appendix 4. The following is now included:<br>• audio and visual equipment;<br>• other durable goods for recreation and culture; and<br>• jewellery, clocks and watches.<br><br>The following has been removed:<br>• household textiles;<br>• glassware, tableware and household utensils; and<br>• non-durable household goods. | 17.58 |

# APPENDIX 5 GDP, WELL-BEING AND SUSTAINABILITY

## INTRODUCTION

A5.1 Recently there has been an increasing interest in measuring the progress and well-being of a society. It is widely accepted that measuring progress and well-being requires the bringing together of social, economic and environmental activities.

A5.2 Gross domestic product (GDP) is the most widely used measure of economic activity. The calculation of GDP is based on an internationally agreed, long standing set of standards and in essence measures market production.

A5.3 GDP is also used on occasion as a measure of wider economic progress or well-being. While it is true that GDP has been shown to be closely correlated to other elements of progress or well-being which many people consider important (such as employment, education and health outcomes), it has been designed as a measure of production, and not as a measure of progress or well-being.

A5.4 Being a monetary value measure, GDP does not cover goods and services that statistical authorities cannot or have not assigned a value. Examples of these are: household production, entrance-free beach visits, and wildlife viewing. In other words, it does not measure well-being that goes beyond GDP, including environmental and social aspects of economic activities.

A5.5 Furthermore, GDP, as an overall measure of economic welfare, does not reveal inequality concerns - e.g. the consumption possibilities of the poor compared with those of the rich.

A5.6 It is important to note that, whilst much emphasis is placed on GDP as a measure of well-being, the ASNA publishes other economic indicators which could be more appropriate, such as real gross national income, or real net national disposable income per capita.

A5.7 This chapter will provide an overview of the work that has been undertaken both internationally and domestically on this issue.

## THE COMMISSION ON THE MEASUREMENT OF ECONOMIC PERFORMANCE AND SOCIAL PROGRESS

### Introduction

A5.8 In February 2008, the then French President, Nicholas Sarkozy, created a commission (subsequently called "The Commission on the Measurement of Economic Performance and Social Progress" (The Commission)) to "identify the limits of GDP as an indicator of economic performance and social progress, including the problems with its measurement; to consider what additional information might be required for the production of more relevant indicators of social progress; to assess the feasibility of alternative measurement tools, and to discuss how to present the statistical information in an appropriate way."[69] While there is an extensive history of literature on the measurement of well-being and progress prior to the work of the Commission, the report provides a useful framework for discussing issues common to much of the literature.

A5.9 The Commission stated that it has become increasingly important to design and assess policies for advancing society not just measure economic production. The existing statistical measures are conceptually correct for what they are designed to measure but the policy issues are a lot broader now.

A5.10 The Commission also made the point that existing statistical measures (such as GDP) are not wrong as such, but are wrongly used. Therefore it is essential that there is a better understanding of the appropriate use of each measure. It is clear that GDP is not a measure of well-being and that other economic, social and environmental dimensions need to be taken into account.

[69] Stiglitz, J., Sen, A. and Fitoussi, J-P, *Report by the Commission on the Measurement of Economic Performance and Social Progress*, 2009, page 7

A5.11 Some members of the Commission believed that focussing on the wrong set of indicators led to economic analysts and government officials being taken by surprise when the global financial crisis occurred. They argued that if they had focussed on metrics that incorporated sustainability measures (such as indebtedness), and not just standard measures such as GDP, they would have had a more cautious view of economic performance. They make the point however that an alternate measurement system may not have been sufficient to avoid the crisis.

A5.12 The Commission indicates that society is facing an environmental crisis and that standard measures of economic performance might look different if environmental costs were taken into account.

A5.13 The Commission is convinced that "those attempting to guide the economy and our societies are like pilots trying to steer a course without a reliable compass"[70] unless there is a better set of metrics. It recognises that research in recent years has led to the development of a better set of metrics and it is time to incorporate them in our measurement systems.

A5.14 The report also distinguished between:

- current well-being – which is about economic resources, such as income, as well as non-economic aspects of peoples' lives (what they do and can do, how they feel, and the natural environment they live in); and
- sustainability – which depends on whether stocks of capital that matter for our lives (natural, physical, human, social) can be passed on to future generations.

### Main messages and recommendations

A5.15 The Commission looked at the following three aspects:

1. classical GDP issues;
2. quality of life; and
3. sustainability.

A5.16 Before looking at these aspects in more detail it is important to define well-being. The Commission noted that well-being requires a multi-dimensional definition and that it is necessary to take into account all dimensions. The Commission based the following list of key dimensions on academic research and a number of concrete initiatives developed around the world:

- material living standards (income, consumption and wealth);
- health;
- education;
- personal activities including work;
- political voice and governance;
- social connections and relationships;
- environment (present and future); and
- insecurity, of an economic as well as a physical nature.

### Classical GDP issues

A5.17 The Commission stated

*"GDP is not wrong as such, but wrongly used. What is needed is a better understanding of the appropriate use of each measure."*[71]

[70] Stiglitz et. al., page 9
[71] Stiglitz et al., page 8

A5.18 According to The Commission, the faults with GDP being used as a welfare measure are that:

- it is gross;
- it is domestic; and
- it is production focussed.

A5.19 What is needed to measure economic welfare is a measure that in concept is net (i.e. which takes into account depreciation), is national (i.e. takes into account imports) and is income related. That is, a measure of net national income: this is defined in the SNA framework and is published on a quarterly basis within the ASNA.

A5.20 The Commission reviewed the existing measures of economic performance in order to determine areas of weakness before tackling the issues of measuring well-being. It concluded that there are two areas of weakness:

1. measuring quality and making appropriate adjustments; and
2. measuring government output.

A5.21 The Commission stated that "the time is ripe for our measurement system to *shift emphasis from measuring economic production to measuring people's well-being*. And measures of well-being should be put in a context of sustainability."[72] This is important because there is a gap between the information contained in the aggregate GDP data and people's well-being. In order to close this gap it is necessary to develop a statistical system that complements measures of market activity by measures centred on well-being and sustainability. As stated previously, no single measure will accomplish this; rather measuring several dimensions of well-being is advocated.

A5.22 The following table outlines the list of recommendations the Commission made in relation to classical GDP issues. The ABS has been aware of these issues for many years and has an ongoing work program to address several issues. The table also summarises the ABS work associated with each of the issues:

Table A5.1 Classical GDP issues – Stiglitz recommendations and ABS work

| Stiglitz recommendation | ABS work |
|---|---|
| 1. When evaluating material well-being, look at income and consumption rather than production – measures such as net national income, real household income and consumption are key | Measures of income and consumption have been published for many years in the *Australian System of National* Accounts (cat no 5204.0) and the quarterly publication *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0).<br><br>Real measures of income are published in the first table (i.e. Key National Accounts Aggregates) of both publications. Chapter 20 provides more details on the concept and methods used to calculate the measures. |
| 2. Emphasise the household perspective – in-kind services provided by government should be reflected in income and consumption | The household perspective is published in the *Australian System of National* Accounts (cat no 5204.0). It is reflected in the Household Adjusted Disposable Income Account. The concept and method used to derive the table is outlined in the section Adjusted disposable income account (paragraphs 13.73 to 13.79). |
| 3. Consider income and consumption jointly with wealth – a household's balance sheet is necessary to measure future well-being or sustainability | The annual household balance is published in the *Australian System of National* Accounts (cat no 5204.0). Development of a quarterly household balance sheet is currently underway and is expected to be released in the September quarter 2013 release of 5232.0.<br><br>The concepts and methods used to compile the balance sheets are outlined in Chapter 17.<br><br>The biennial ABS Survey of Income and Housing includes |

[72] Stiglitz et. al., page 12

| | |
|---|---|
| | the coincident measurement of income and wealth, while the six yearly ABS Household Expenditure Survey includes the coincident measurement of household income, expenditure and wealth. Refer also to Recommendation 4. |
| 4. Give more prominence to the distribution of income, consumption and wealth – average measures are meaningful but should be accompanied by indicators that reflect distribution such as median distributions and joint distributions | The ABS household economic resource surveys described under Recommendation 3 allow distributional analysis of household income, consumption and wealth including the joint distributions of each of these dimensions. For example, it is possible to look at the characteristics of households with low incomes, low wealth or both low income and low wealth.<br><br>The OECD has established an Expert Group to Measure Disparities in the National Accounts Framework and the ABS is a member of this expert group. The aim of this group is to devise a robust and internationally comparable methodology that would allow the generation of distributional information on households consistent with the macro (national accounts) estimates.<br><br>Details of the work being undertaken by this group are outlined in the *Measuring household disparities in the national accounts framework* section below.<br><br>A second OECD Expert Group, chaired by the ABS, has also been established on micro statistics on household income, consumption and wealth. The Expert Group is developing new international guidelines on the compilation and analysis of micro statistics on household wealth, and a comprehensive and integrated framework for micro statistics on household income, consumption and wealth. The Expert Group's work is expected to be released in 2013 in two OECD publications. |
| 5. Broaden income measures to non-market activities – need to recognise the services households produce for themselves which are not included in the official income and production measures | The ABS has produced three papers to provide measures of unpaid work, the latest being *Unpaid Work and the Australian Economy, 1997* (cat. no. 5240.). The measurement of unpaid work is fundamental to the production of a household satellite account but due to a number of conceptual and methodological issues needing to be resolved, the ABS has not produced a household satellite account to date.<br><br>Chapter 23 provides more detail on the development of household satellite accounts and the work the ABS has done in producing measures of unpaid household work. |

Quality of life

A5.23 The Commission states that the "quality of life includes the full range of factors that make life worth living, including those that are not traded in markets and not captured by monetary measures." There are other indicators which are important in measuring social progress. These measures, while not replacing conventional economic indicators, provide an opportunity to enrich policy discussions and to inform people's view of the conditions of the communities in which they live. They have the potential to move from research to standard statistical practice.

A5.24 The following table outlines the Commission's recommendations as well as the work being undertaken by the ABS to address the issues:

Table A5.2 Quality of life – Stiglitz recommendations and ABS work

| Stiglitz recommendation | ABS work |
|---|---|
| 6. Statistical offices should measure subjective well-being (i.e. information about people's quality of life including cognitive evaluations of one's life, happiness, satisfaction, positive emotions and negative emotions) | The ABS has asked an overall life satisfaction question in a number of surveys (2010 General Social Survey, 2007 Survey of Mental Health and Wellbeing, and the 2001 National Health Survey).<br><br>An OECD working group, with ABS involvement, has been developing guidelines for the measurement of subjective well-being. Some of the proposed questions are being tested for possible inclusion in the ABS Work, Life and Family Survey (WoLFS) in 2013. The specific questions cover overall life satisfaction as well as satisfaction with key areas of life (such as standard of living, health, achieving in life, personal relationships, feeling safe, feeling a part of the community, future security, having time to do the things you like, and your job). |
| 7. Steps should be taken to improve measures of people's health, education, personal activities, political voice, social connections, environmental conditions and insecurity and thereby improve the objective measures of well-being | During 2011-12, the ABS has undertaken a national consultation to review its flagship publication, *Measures of Australia's Progress* (MAP) (cat. no. 1370.0) to ensure that the ABS is still measuring what is important to Australian's for national progress. The aspirations for progress that emerged from the consultation will form the basis of a refreshed set of progress indicators for MAP 2013. |
| 8. Quality of life indicators in all the dimensions they cover should assess inequalities in a comprehensive way | MAP will seek to present its progress indicators, where possible by relevant disaggregation to highlight inequalities. For example, it will aim to show the headline health indicator by population and age groups as well as by region. |
| 9. Surveys should be designed to assess the links between various quality of life domains for each person, and this information should be used when designing policies in various fields | See Recommendation 6 above.<br><br>The ABS is conducting WoLFS in 2013 as a combination of the Time Use Survey and the Survey of Employment Arrangements, Retirement and Superannuation. The combined survey will increase the capacity to report across the life cycle on a wide range of aspects relating to work (both paid and unpaid) and how people and families balance the different activities in their daily lives. |
| 10. Statistical offices should provide the information needed to aggregate across quality-of-life dimensions, allowing the construction of different scalar indexes | The ABS is not currently producing such an index. There is no international consensus on how this is to be done to date, however the OECD has done some work in this case. |

Sustainability

A5.25 A significant issue the Commission investigated is how to measure and assess sustainability. The key challenge of sustainability is determining whether or not the current level of well-being can be maintained for future generations. Given sustainability involves the future its assessment will require many assumptions. This is further complicated by the inter-relationship of the effects of the environment and socio-economic models followed by other countries.

A5.26 The following table indicates the Commission's recommendations in light of the issues outlined above and the work being undertaken by the ABS in addressing the issues:

Table A5.3 Sustainability – Stiglitz recommendations and ABS work

| Stiglitz recommendation | ABS work |
|---|---|
| 11. Sustainability assessment requires a well-identified dashboard of indicators that inform us about the change in the quantities of the various factors for future well-being – they should be interpretable as variations of some underlying stocks | Sustainability emerged from the MAP consultation as a cross-cutting idea, across both the economic and environment domains. The key aim of sustainability was seen to be meeting the social, economic and environmental needs of Australian's today without compromising the needs of future generations. The consultation suggested a range of important economic and environmental aspects that should be considered when seeking measures of sustainability; such as, financial, economic, human, environmental and natural resource use and management; development and use of adaptive technologies and strategies, climate change and waste management. Currently MAP provides indicators of environmental change over time such as net greenhouse gas emissions and threatened fauna species.<br><br>The ABS is collaborating with the Measuring Sustainability program, led by the Department of Sustainability, Environment, Water, Population and Communities. The program is part of the sustainable population strategy - Sustainable Australia, Sustainable Communities - and aims to provide improved information on social, environmental and economic sustainability to assist decision-making and planning at national and community levels, including the development of a set of sustainability indicators. |
| 12. The environmental aspects of sustainability deserve separate follow-up based on a well-chosen set of physical indicators – there is a need to have clear indicators of our proximity to dangerous levels of environmental damage | The ABS publication *Completing the Picture – Environmental Accounting in Practice* (cat. no. 4628.0.55.001) outlines how environmental accounts can be used and further developed in Australia within the *System of Environmental-Economic Accounting* (SEEA) framework. It addresses the issue of sustainability as well as other environmental-economic issues.<br><br>For more detail refer to Chapter 23. |

## Conclusion

A5.27 The Commission regards its report as opening a discussion rather than closing it. It encourages global debate around the issues and its recommendations. It hopes the report will lead to on-going research into the development of better metrics that will enable a better assessment of economic performance and social progress.

A5.28 The ABS recognises the importance of the issues raised in the report. The ABS is continuing to undertake research to address the issues which have not been addressed to date.

## MEASURES OF AUSTRALIA'S PROGRESS

### Introduction

A5.29 In April 2002, the Australian Bureau of Statistics made a major contribution to measuring whether life is getting better in Australia with the release of the first issue of *Measures of Australia's Progress* (MAP) (cat. no. 1370.0), then called *Measuring Australia's Progress*. At that time, the *Bulletin* magazine referred to this publication as a revolutionary set of indicators which provided great insights on how life is improving, and at what rate.

### Concept of progress

A5.30 The concept of progress is central to MAP. In its broadest sense, we define progress to be synonymous with life getting better. In addressing this concept, MAP examines many aspects of people's lives, for example, their health, the quality of their environment, their incomes, work and leisure, security from crime, and so on.

A5.31 The ABS acknowledges that progress is multidimensional. Whether or not Australia is progressing depends on all of these factors: on the state of our environment, the health of our economy and a variety of areas of individual and societal well-being. Measures of progress for each dimension are necessary.

A5.32 There is no statement in MAP about whether Australia is progressing, or at what rate it is progressing. Instead, the information is presented in such a way that readers can consider the relative importance of progress in each dimension and bring their own personal evaluations to these questions.

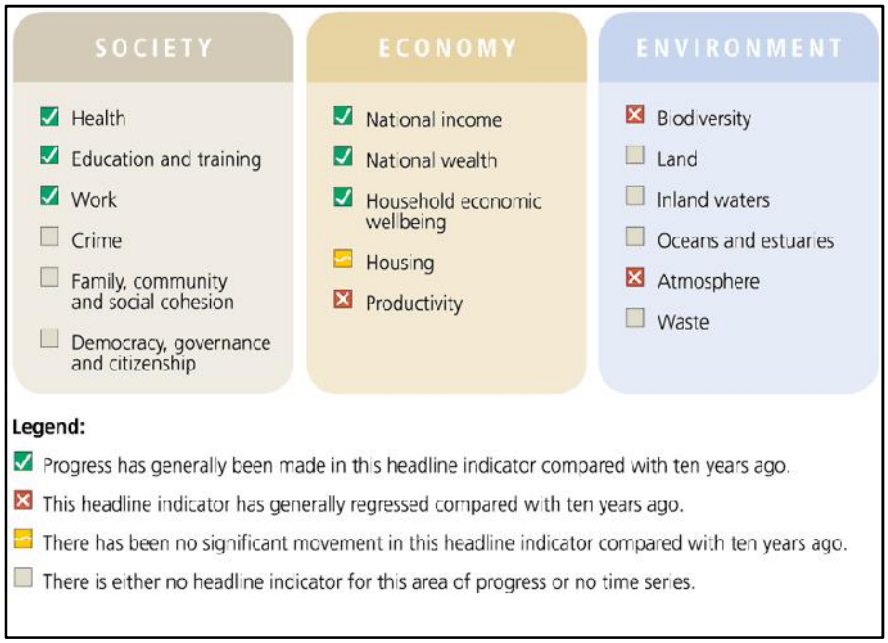
### What is MAP?

A5.33 MAP is designed to help Australians address the question, 'Is life in Australia getting better?'. MAP provides a digestible selection of statistical evidence in answer to this question and this evidence can be used to form a view of how Australia is progressing.

A5.34 The range of key statistical measures that MAP presents demonstrate change over the period of a decade. They are grouped under three broad headings: the society, the economy and the environment. Within these broad domains several dimensions are addressed, such as health and work within the social domain, national income within the economic domain, and biodiversity within the environmental domain. Within each dimension there are a range of statistical measures presented, known as progress indicators. These indicators tell a story about the extent of progress within that dimension.

A5.35 The following outlines the MAP dashboard:

Table A5.4 Measures of Australia's Progress (MAP) dashboard




A5.36 Ultimately, MAP is intended to complement the full array of statistics available in Australia.

### MAP review and future work

~~A5.37~~ Since 2002, *Measures of Australia's Progress* (MAP) has been bringing together selected statistics about society, the economy and the environment to provide insight into national progress. Over the last decade, international and national interest in measuring progress has accelerated and in light of these developments, the ABS has reviewed MAP to ensure that it still measures those aspects of life that matter most to Australians.

A5.38 The broad-ranging consultation process focussed on asking a wide range of Australians 'What is important to you for national progress?' The report *Measures of Australia's Progress – Aspirations for our nation: A conversation with Australians about progress* (released in November 2012), provides an account of the consultation process and the aspirations that came from it. The next phase of the MAP review will be to use the consultation results, together with expert statistical advice, to develop a refreshed set of indicators for MAP.

## MEASURING HOUSEHOLD DISPARITIES IN A NATIONAL ACCOUNTS FRAMEWORK

A5.39 In December 2010 Australia, along with approximately 20 other countries, joined the OECD Expert Group on the measurement of disparities in a national accounts framework. The aim of the group was for countries to use existing household microeconomic data to produce distributional estimates of household income, consumption and wealth based on national accounts estimates that are consistent with concepts expressed in the 2008 SNA.

A5.40 The work of the group was broken down into two phases:

1. Provide description and comparison of estimates on household income, consumption and wealth from microeconomic (ABS household surveys) and macroeconomic sources (national accounts aggregates). Microeconomic data for income and wealth was obtained from the 2009-10 Survey of Income and Housing, and information on consumption was extracted from the 2009-10 Household Expenditure Survey. National accounts aggregates were obtained from *Australian System of National Accounts, 2010-11* (cat. no. 5204.0). Where possible, direct comparison of microeconomic variables and national accounts aggregates were made and

quantified; where direct comparison is not possible, microeconomic (and/or macroeconomic) estimates are adjusted to derive the most relevant common scope for the comparison.

2. Disaggregate the national accounts household sector by groups of households on income, consumption and wealth distributions consistent with national accounts aggregates. Results from Phase 1 provide a starting point for Phase 2, that is the national accounts components (direct or adjusted) reconciled to microeconomic components in turn provide the distributional information by household group.

A5.41 Preliminary distributional estimates have been produced for national accounts income and consumption aggregates by the following household groups:

- main source of income (wages & salaries; income from self-employment; property income; transfers & other);
- equivalised (i.e. adjusted for household size and composition) adjusted disposable income quintiles (Q1:lowest and Q5:highest); and
- household type (single less than 65; single 65 and over; two adults less than 65; two adults at least one 65 and over; two adults or more with children; and other).

A5.42 Preliminary distributions for wages and salaries, dividends, adjusted disposable income, actual consumption and gross saving by groups of households have been compiled. Where microeconomic data are not available or are inadequate for distributional purposes, various imputations are implemented to allocate the national accounts aggregates across the household subgroups, for example the distribution of FISIM is imputed (FISIM is required to compile estimates of household interest received and paid).

A5.43 The distributional estimates produced so far are preliminary. ABS is still refining methodology and validating the results. ABS plans to produce an information paper with final results for 2009-10 ASNA household income, consumption and wealth in 2013.

# APPENDIX 6 NON-OBSERVED ECONOMY

## INTRODUCTION

A6.1 One of the main objectives in compiling the national accounts is to produce several key economic aggregates such as gross domestic product (GDP) and saving. In compiling these aggregates, the primary aim is to ensure that they and their components are measured as exhaustively as possible within the boundary of economic production prescribed in the 2008 SNA and the ASNA. However, it is not possible to regulate and perfectly capture the data required to measure them completely exhaustively.

A6.2 A potential source of understatement for measures such as GDP and saving is the non-observed economy (NOE). The NOE refers to economic activities that are often missing from the data sources used to compile the national accounts.

A6.3 It is not possible to directly measure the impact of missing underground transactions. Estimates of their potential impact rely on a variety of indirect methods using assumptions, the results of which are likely to remain conjectural.

## THE NON-OBSERVED ECONOMY

A6.4 An OECD publication titled *Measuring the Non-Observed Economy: A Handbook*[73], (the Handbook) was released in 2002. Its aim was to assist statistical agencies in the task of ensuring that their estimates of GDP are as complete as possible.

A6.5 The non-observed economy, by its very nature, cannot be directly measured. Estimates of it must, therefore, rely on limited indicative information and a variety of indirect methods, all of which can be regarded as contentious. It is likely that an unknown proportion of underground production would be captured in the official GDP estimates due to the data sources used and the estimation methods employed. Nevertheless, it is accepted that additional adjustments for underground activity are required.

A6.6 The underground economy has been referred to by many terms such as, 'non-observed', 'informal', 'parallel', 'concealed', 'unmeasured', 'unrecorded', 'untaxed', 'cash' and 'black'. There is no common understanding on whether these terms all mean the same thing, and if not, what relationship they have to one another. Measurement of the underground economy can also be undertaken using a variety of methods. The ABS follows the Handbook's terminology and method of measurement to estimate the non-observed economy.

[73] Organisation for Economic Cooperation and Development, the International Monetary Fund, the International Labour Organisation and the Commonwealth of Independent States, *Measuring the Non-Observed Economy: A Handbook*, Paris, 2002

A6.7 The Handbook drew on the 1993 SNA definitions to define the various aspects of the non-observed economy and to promote a common nomenclature. These remain consistent with the 2008 SNA. The Handbook defines the NOE as activities which should be included in national accounts, but are not covered in statistical surveys or administrative records used in the national accounts compilation. The Handbook outlines five components of the NOE and these are outlined in the following table:

Table A6.1 Components of the non-observed economy

| | Components |
|---|---|
| **Economic underground** – units which are deliberately under/over reporting and/or do not register with the tax office | Underground production (cash economy) |
| | Illegal production |
| | Informal sector production |
| **Other non-observed economic activity** | Household production for own final use |
| | Statistical underground |

A6.8 The ABS first released an information paper on the underground economy detailing the data sources, methodology and adjustments made to income data in 2003. A summary of the findings of this work was published in the October 2003 issue of *Australian Economic Indicators* (cat. no. 1350.0).

A6.9 The ABS has recently reviewed its treatment of the NOE in the estimation of GDP and the results were published in the *Information Paper: The Non-Observed Economy and Australia's GDP* (cat. no. 5204.0.55.008). The rest of this appendix provides a summary of the issues discussed in the paper in relation to each component of the NOE.

## Underground production

A6.10 The 2008 SNA defines underground production as activities which may be legal but are deliberately concealed from public authorities to avoid:

1. the payment of income, value added or other taxes;
2. the payment of social security contributions;
3. having to meet certain legal standards such as minimum wages, maximum hours, safety or health standards, etc.; and/or
4. complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms.

A6.11 The 2008 SNA concludes that these activities fall within the production boundary irrespective of their legality and transactions on unofficial markets that exist in parallel with official markets must be included in the accounts.

A6.12 For the ABS, the main concern is the impact unmeasured transactions may have on the quality of the national accounts and other business statistics, rather than transactions that may escape detection by the tax authorities. Unreported, undeclared or untaxed transactions are not synonymous with unmeasured transactions in the national accounts. The Handbook observes that:

*"...Untaxed income cannot be directly related to untaxed production as taxable income may be generated by activities that are not productive. There is also an important distinction between*

*untaxed production and non-measured underground production. The former relates to a shortfall in government revenues, the latter to a shortfall in GDP estimates."* [74]

A6.13 The method currently used by the ABS is to systematically analyse each component of GDP and make judgements as to the maximum feasible level of underground activity. This is approach recommended in the international guidelines. In undertaking this analysis, subjective judgements are applied at the most detailed level possible for each component of GDP. While such judgements are obviously subject to a large margin of error, when totalled they provide a reasonable indication of what is plausible in terms of GDP.

A6.14 Consequently, explicit upward adjustments are currently made in the ASNA to account for underground production. A wide variety of data sources and cross checks are used to assist in the indirect capture of underground activity. The publication *Information Paper: The Non-Observed Economy and Australia's GDP* (cat. no. 5204.0.55.008) provides more detail on the method and data sources used for measuring underground production as well as the results.

### Illegal production

A6.15 The 2008 SNA explicitly states that illegal production should be included within the production boundary, provided a production process exists and the outputs have market demand. Theft, for example, fails this test and is excluded from measurement in the accounts.

A6.16 The SNA classifies illegal production within two categories:

1. the production of goods or services whose sale, distribution or possession is forbidden by law; and

2. production activities that are usually legal but become illegal when carried out by unauthorized producers, for example, unlicensed medical practitioners.

A6.17 Transactions for illegal products need to be recorded to obtain comprehensive measures of production and consumption and to prevent errors appearing elsewhere in the accounts. The ABS does not cover illegal production because of data limitations.

A6.18 To evaluate new data sources and the possible addition of some elements of illegal production, an experimental study was undertaken to estimate the impact of the illegal drug economy and its size relative to Australia's GDP. To generate experimental estimates of the illegal drug economy in Australia, the general measurement framework is based on a method developed in the United Kingdom by the Office for National Statistics. The assumed identities forming the framework are:

- Domestic supply of drugs = (domestic production + imports) - (seizures + exports)
- Demand = household consumption

This framework adjusts for the loss on domestic supply from police seizures.

A6.19 The publication *Information Paper: The Non-Observed Economy and Australia's GDP* (cat. no. 5204.0.55.008) provides more detail on the method and data sources used for measuring illegal production as well as the results obtained for the experimental study.

[74] OECD et. al., 2002, para 8.12

## Informal economy production

A6.20 The informal economy represents an important part of the economy and the labour market in many countries, especially developing countries. Thus, measurement of the informal economy is important in its own right as well as contributing towards exhaustive estimates of GDP.

A6.21 The vast majority of informal economy activities provide goods and services whose production and distribution are perfectly legal. This is in contrast to illegal production. There is also a clear distinction between the informal economy and underground production. Informal economy activities are not necessarily performed with the deliberate intention of evading the payment of taxes or social security contributions, or infringing labour legislation or other regulations.

A6.22 The 2008 SNA characterises the informal economy as:

1. consisting of units engaged in the production of goods or services with the primary objective of generating employment and incomes to the persons concerned; and

2. production units have the characteristic features of household enterprises.

A6.23 Therefore, informal economy production is defined as those productive activities conducted by unincorporated enterprises in the household sector that are unregistered and/or less than a specified size in terms of employment and that have some market production.

A6.24 In summary, the informal economy plays a major role in employment creation, production and income generation. Consequently is not as significant in developed countries as for developing countries where there is a lack of social safety nets such as unemployment benefits. Informal production is relatively unimportant in Australia and as such, the ABS (nor the SNA) does not attempt to distinguish between the formal and informal economies in its sub-sectoring of the household sector.

## Household production for own final use

A6.25 Household production for own final use is defined as productive activities that result in goods or services consumed or capitalised by the households that produce them. These are usually perfectly legal and there is no reason for producers to conceal their activities. They may be omitted only because there are no observable transactions between the sellers and producers.

A6.26 Household production for own final use consists of:

- goods produced for own final use, including crops and livestock, production of other goods for own consumption, and own-account fixed capital formation;
- owner-occupied dwelling services; and
- employment of paid domestic staff.

A6.27 The provision of owner-occupied dwelling services by households are a significant component of household final consumption expenditure. The provision of these services are included in the ASNA.

A6.28 Other 'own account' activities, such as the cultivation of crops and livestock for own final use and the undertaking of own-account construction, are of less significance for Australia than they are for many developing countries. Nevertheless, the ABS has been making adjustments to its national accounts to take account of these sorts of activities in accordance with the relevant 2008 SNA guidelines.

A6.29 The ASNA includes 'backyard production' (i.e. production of wine, fruit and vegetables by the household) in its estimate of output, household final consumption expenditure and gross mixed income. The benchmark estimate of backyard production is based on the 1992 ABS survey *Home Production of Selected Foodstuffs* (cat. no. 7110.0) at market prices with some adjustments which effectively result in a 'gross' market value less production expenses. The benchmark is moved forward based on movements of food and alcohol in the ABS publication *Retail Trade, Australia* (cat. no. 8501.0).

A6.30 Imputations are made for the value added by owner-builders in the construction, alteration or extension of their dwellings. Imputations are also made for owner-occupied dwelling services.

A6.31 The publication *Information Paper: The Non-Observed Economy and Australia's GDP* (cat. no. 5204.0.55.008) provides more detail on the methods and data sources used for measuring household production for own final use as well as the results.

A6.32 It is worthwhile noting that there are some household activities that are excluded from household production for own final use as well as the informal sector. Namely, housing services provided by owner-occupiers such as cooking, cleaning, laundry, caring for children, minor home repairs, etc.

### Statistical underground production

A6.33 Statistical underground production is production that is missed due to deficiencies in data collection, for example:

- incompleteness of statistical surveys and administrative records;
- under coverage of enterprises;
- non-response; and
- under reporting.

A6.34 These issues are addressed as part of the survey design and sample, frame and maintenance procedures employed by the ABS. Therefore the statistical outputs of the collections that feed into the compilation of the ASNA have taken these issues into account. Consequently the ASNA is not required to undertake any additional activity to address the issue of statistical underground production. The ASNA implicitly addresses the issues by way of assessing the data against the Data Quality Framework as outlined in Chapter 24.

## CONCLUSION

A6.35 In the compilation of the ASNA allowances are made for the NOE. Currently explicit upward adjustments are made for underground production and household production for own final use. Adjustments are also made to ensure deficiencies in data collection are captured.

A6.36 There are no plans to incorporate illegal production in the ASNA. The data limitations are too significant to consider incorporation. Future experimental estimates may be produced depending on funding and resources.

A6.37 Informal sector production is deemed to be insignificant in Australia and therefore no adjustments are made to the ASNA.

A6.38 The measurement of the NOE is difficult but important to ensure that GDP and its components are measured as exhaustively as possible within the boundary of economic production prescribed in the 2008 SNA and the ASNA. The ABS will review its work in this area on an on-going basis in order to improve measurement of GDP.

## GLOSSARY

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| Accrual accounting | The accounting process of recording flows at the time when economic value is created, transformed, exchanged, transferred or extinguished. |
| Actual final consumption | Actual final consumption records consumption in the sector in which the good or service is actually consumed rather than in the sector than incurs the expenditure. See also Household actual final consumption and Government actual final consumption. |
| Adjusted disposable income | Consistent with the estimation of an alternative measure of consumption (see Actual consumption) an alternative measure of disposable income can also be measured. Adjusted household disposable income is measured by adding the value of individual consumption (recorded as transfers in kind on the income side of the account) to gross disposable income. |
| Agricultural factor income | The total factor income arising from production in agriculture and services to agriculture. It is equal to the estimated gross value of production (after the inventory valuation adjustment) less estimated production costs other than compensation of employees and consumption of fixed capital for all enterprises engaged in agriculture and services to agriculture. It includes agricultural output produced by the household sector for its own consumption. |
| Agricultural income | The income accruing from agricultural production during an accounting period. It is equal to total agricultural factor income less consumption of fixed capital, compensation of employees, and net rent and interest payments. |
| Agricultural production costs | Includes all costs (other than compensation of employees and consumption of fixed capital) incurred in current production, but exclude net rent and interest payable which are treated as appropriations out of operating surplus. In general, marketing costs are as shown in the statistical publication *Agriculture, Australia* (cat. no. 7113.0), and represent the difference between the value at the farm or other place of production and at the wholesale markets. Other costs include taxes on production and imports, fertilisers, fuel, costs associated with inter-farm transfers of livestock and fodder, maintenance and other miscellaneous items. |
| Assets | Assets are a store of value over which ownership rights are enforced by institutional units, individually or collectively, and from which economic benefits may be derived by their owners by holding them, or using them, over a period of time (the economic benefits consist of primary incomes derived from the use of the asset and the value, including possible holding gains/losses, that could be realised by disposing of the asset or terminating it). |
| Asset-backed security | A debt security which is backed by specific assets (such as mortgages over real estate) rather than the general credit-worthiness of the issuing entity. |
| Australian production | Australian production refers to the value at basic prices of goods and services produced in Australia. |
| Balance sheet | A balance sheet is a statement, drawn up in respect to a particular point in time, of the values of assets owned and of the liabilities owed by an institutional unit or group of units. A balance sheet may be drawn up for institutional units, institutional sectors and the total economy. |
| Balancing item | A balancing item is obtained by subtracting the total value of the entries on one side of an account from the total value of entries the other side. It cannot be measured independently of the other entries. It does not relate to any specific set of transactions, or any set of assets, and so it cannot be expressed in terms of its own price or quantity units. |
| Balancing item (State Accounts) | The published balancing item in the State Accounts is the residual of Gross State Product (GSP) less state final demand less net international trade in goods and services. It implicitly comprises change in inventories at a State level, plus net interstate trade. |
| Base period | Refers to the period that provides the weights for an index. |
| Basic prices | The basic price is the amount receivable by the producer from the purchaser for a unit |

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| | of a good or service produced as output minus any tax payable, and plus any subsidy receivable, on that unit as a consequence of its production or sale. It excludes any transport charges invoiced separately by the producer. Output sold at prices that are not economically significant (see also Economically significant prices) is not valued at these prices. Rather, such output is valued at its cost of production. |
| Bearer securities | Debt securities for which the issuer does not maintain a register of current holders. Settlement of transactions (trades) may be effected by delivery. |
| Benchmarking | Benchmarking can have two meanings. The first refers to the practice of extrapolating from a high quality observation for a particular period, or interpolating between two or more high quality observations, using a lesser quality, but more frequent indicator. The second refers to the practice of imputing quarterly values for a statistic by using a quarterly indicator, such that the resulting quarterly estimates are constrained to sum to the annual estimates. |
| Bills of exchange | A bill of exchange is an unconditional order drawn (issued) by one party, sent to another party (usually a bank) for acceptance and made out to, or to the order of, a third party, or to bearer (holder). It is a negotiable instrument with an original term to maturity of 180 days or less. Bills of exchange are also known as 'banker's acceptance'. |
| Bonds | Bonds are long-term securities where the issuer's pledges to pay the holder the sum of money shown on the face of the document, on a date which at the time of issue is more than one year in the future. Many bonds on issue in Australia pay interest at a set percentage of face value every six months (known as "coupon interest") for the life of the bond. Such bonds are known as fixed interest bonds. However, there are a significant amount of variable rate bonds and some deep discount (or zero coupon) bonds on issue. |
| Business and government tourism consumption | Business and government tourism consumption consists of the tourism consumption by resident businesses or governments on tourism related products within Australia. It is also referred to as internal tourism consumption by domestic businesses and government visitors. |
| Capital account | The capital account records the values of the non-financial assets that are acquired, or disposed of, by resident institutional units by engaging in transactions, and shows the change in net worth due to saving and capital transfers or internal bookkeeping transactions linked to production (changes in inventories and consumption of fixed capital). |
| Capital deepening | Capital deepening (or capital intensity) refers to changes in the capital to labour ratio. Increased capital deepening means that, on average, each unit of labour has more capital to work with to produce output. |
| Capital productivity | Capital productivity estimates are indexes of real GDP per unit of capital services used in production. They have been derived by dividing the index of the chain volume measure of market sector GDP by an index of capital services. The capital productivity indexes reflect not only the contribution of capital to changes in production, but also the contribution by labour and other factors affecting production. |
| Capital transfers | Capital transfers are transactions in which the ownership of an asset (other than cash and inventories) is transferred from one institutional unit to another, in which cash is transferred to enable the recipient to acquire another asset or in which the funds realised by the disposal of another asset are transferred. Examples include general government capital transfers to private schools for the construction of science blocks or libraries, and transfers to charitable organisations for the construction of homes for the aged. |
| Captive financial institutions and money lenders | Captive financial institutions and money lenders consist of institutional units providing financial services, where most of either their assets or liabilities are not transacted on the open financial markets. |
| Central borrowing authorities | A statutory body - often called a Treasury Corporation - established by a State or Territory government to borrow on its behalf and on behalf of its trading enterprises, and to on-lend the funds raised to those bodies. Most borrowing authorities also manage liquid assets on behalf of government bodies. |

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| Chain price indexes | Chain price indexes are obtained by first weighting together elemental price indexes from the previous financial year to the current financial year to produce annual indexes, or to quarters in the current financial year to produce quarterly indexes, where the weights are calculated using expenditure shares of the previous financial year. Second, the resulting aggregate year-to-year or year-to-quarter price indexes are linked (compounded) together to form a time series. Third, the time series is referenced to 100.0 in the reference year. All quarterly indexes are benchmarked to annual indexes. |
| Chain volume measure | For certain types of economic analysis it is useful to examine estimates of the principal flows of goods and services in the economy re-valued in such a way as to remove the direct effects of changes in their prices over the period under review. Chain volume measures for GDP and other aggregates are obtained by linking together (compounding) movements in volumes, calculated using the average prices of the previous financial year, and applying the compounded movements to the current price estimates of the reference year. |
| Changes in inventories | Changes in inventories represent the difference in value between inventories held at the beginning and end of the reference period by enterprises and general government. For national accounting purposes, physical changes in inventories should be valued at the prices current at the times when the changes occur. For these purposes, changes in inventories are obtained after adjusting the increase in book value of inventories by the inventory valuation adjustment. The need for the latter arises because the changes in the value of inventories as calculated from existing business accounting records do not meet national accounting requirements. The inventory valuation adjustment is the difference between the change in (book) value of inventories and the physical changes valued at current prices. The physical changes at average current quarter prices are calculated by applying average quarterly price indexes to the changes in various categories of inventories in volume terms. |
| Coefficient table | A coefficient (I-O) table records the amount of each product (or the amount of output by each industry) used as input per unit of output of the various products/industries. |
| Collective consumption | Collective consumption refers to services provided simultaneously to all members of the community or to all members of a particular section of the community, such as all households living in a particular region. Collective services are automatically acquired and consumed by all members of the community, or group of households in question, without any action on their part. Typical examples are public administration and the provision of security, either at a national or local level. Collective services are the 'public goods' of economic theory. By their nature, collective services cannot be sold to individuals on the market, and they are financed by government units out of taxation or other incomes. The defining characteristics of collective services are as follows: collective services can be delivered simultaneously to every member of the community or of particular sections of the community, such as those in a particular region; the use of such services is usually passive and does not require the explicit agreement or active participation of all the individuals concerned; and the provision of a collective service to one individual does not reduce the amount available to others in the same community or section of the community. There is no rivalry in acquisition. |
| Common fund | An investment fund established by a trustee company to accept monies it holds in trust and other monies invested by the public. Cash common funds are similar to cash management trusts except that they do not issue units nor do they necessarily issue prospectuses. |
| Compensation of employees | Compensation of employees is the total remuneration, in cash or in kind, payable by an enterprise to an employee in return for work done by the employee during the accounting period. It is further classified into two sub-components: wages and salaries; and employers' social contributions. Compensation of employees is not payable in respect of unpaid work undertaken voluntarily, including the work done by members of a household within an unincorporated enterprise owned by the same household. Compensation of employees excludes any taxes payable by the employer on the wage and salary bill (e.g. payroll tax). |
| Competing imports | Competing imports are those products which are both produced domestically and imported, so that substitution between the two sources of supply is possible. |
| Computer software | Computer software refers to computer programs, program descriptions and supporting materials for both systems and applications software. Included are purchased software |

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| | and, if the expenditure is large, software developed on own-account. It also includes the purchase or development of large databases that the enterprise expects to use in production over a period of more than one year. The ASNA does not separately identify databases from computer software as recommended by the 2008 SNA. |
| Consumer durable | Consumer durable is a good that may be used for purposes of consumption repeatedly or continuously over a period of a year or more |
| Consumption of fixed capital | Consumption of fixed capital is the value of the reproducible fixed assets used up during a period of account as a result of normal wear and tear, foreseen obsolescence and the normal rate of accidental damage. Unforeseen obsolescence, major catastrophes and the depletion of natural resources are not taken into account. |
| Contracts, leases and licences | Contracts, leases and licences are non-produced assets that are constructs of society. They are evidenced by legal or accounting actions, such as the granting of a patent or the conveyance of some economic benefit to a third party. Some entitle their owners to engage in certain specific activities and to exclude other institutional units from doing so except with the permission of the owner. These assets consist of patented entities, leases and other transferable contracts. |
| Corporations | Corporations are entities that are capable of generating a profit or other financial gain for their owners; are recognised at law as separate legal entities from their owners who enjoy limited liability; and are set up for purposes of engaging in market production. They also include co-operatives, limited liability partnerships, notional resident units and quasi-corporations. |
| Coverage ratio (for a product) | A product may be produced by more than one industry. The coverage ration shows what proportion of the total domestic supply of a product is produced by the industry to which the product is primary. |
| Cultivated biological resources | Cultivated biological resources includes livestock raised for breeding, dairy, wool, etc., and vineyards, orchards and other plantations of trees yielding repeat products that are under the direct control, responsibility and management of institutional units. Immature cultivated assets are excluded unless produced for own use. |
| Currency | Currency consists of notes and coins that are of fixed nominal values and are issued or authorised by the central bank or government. For Australia the currency asset refers solely to domestic currency. There is little foreign currency in general circulation, and significant holdings are classified as foreign deposits. |
| Current international cooperation | Current international cooperation relates to transfers by the Commonwealth general government sector to non-residents, and includes current transfers to and payments made on behalf of Papua New Guinea, and current transfers under other bilateral aid projects including food aid and disaster relief. |
| Current prices | Estimates are valued at the prices of the period to which the observation relates. For example, estimates for 2010-11 are valued using 2010-11 prices. This contrasts to chain volume measures where the prices used in valuation refer to the prices of the previous year. |
| Current taxes on income, wealth, etc | Current taxes on income, wealth, etc. include taxes on the incomes of households or the profits of corporations, and taxes on wealth that are payable regularly every tax assessment period (as distinct from capital taxes that are levied infrequently). |
| Current transfers | Current transfers are transactions, other than those classified as capital transfers, in which one institutional unit provides a good, service or cash to another unit without receiving from the latter anything of economic value in return. |
| Current transfers from the Commonwealth government to State and local government | Current transfers from the Commonwealth government to State and local government include financial assistance grants to the States and Territories; grants to fund State and Territory health care services, education services, social security and welfare services, and similar specific grants for current purposes; special revenue assistance grants provided to certain States and Territories; financial assistance grants for local governments which are provided through the State and Northern Territory governments; and grants for current purposes made directly to local government bodies. |

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| Current transfers to non-profit institutions | Current transfers to non-profit institutions are transfers for non-capital purposes to private non-profit institutions serving households, such as hospitals, independent schools, and religious and charitable organisations. |
| Databases | Databases consist of files of data organised in such a way as to permit resource-effective access and use of the data. The ASNA does not separately identify databases from computer software as recommended by the 2008 SNA. |
| Debt security | A financial instrument that evidences the issuer's promise to repay the principal at face value on maturity. It may be issued to investors at a discount, and/or the issuer may promise to pay interest (usually at six monthly intervals) to the holders. Unlike shares, debt securities do not confer on the holders ownership rights in the issuing entity. |
| Derivatives | Derivatives are financial instruments that are linked to a specific financial instrument or indicator or commodity, and which provide for market financial risk in a form that can be traded or otherwise offset in the market. Derivatives are used for a number of purposes including risk management, hedging, and speculation. Unlike debt instruments, no principal amount is advanced to be repaid, and no investment income accrues. The value of the derivative derives from the price of the underlying items. |
| Direct allocation of imports | The direct allocation method of recording imports involves allocating imports to the industries which use them and including them with the primary inputs to these industries in deriving the total production. With this method the intermediate consumption and final demand matrices contain only the use of domestic production, and so the intermediate use matrix does not reflect the full input structure of industries. |
| Direct requirement coefficients | Direct requirement coefficients refer to the proportion of inputs directly required from industries by industries to produce $100 of output. In calculating the direct requirements coefficients, the flow on effects on industries are not taken into account. |
| Direct tourism gross domestic product | Direct tourism GDP is direct tourism gross value added plus net taxes on products that are attributable to the tourism industry (tourism net taxes on products). Direct tourism GDP will generally have a higher value than direct tourism value added. |
| Direct tourism gross value added | Direct tourism gross value added is the value of direct tourism output at basic prices less the value of inputs used in producing these tourism products. This measure is directly comparable with the value added of 'conventional' industries such as mining and manufacturing and should also be used for comparisons across countries. |
| Direct tourism output | Direct tourism output is the value of goods and services at basic prices which are consumed by visitors and produced in Australia by industries in a direct relationship with visitors. |
| Discount securities | Debt securities which are issued to investors for less than the value appearing on the face of the security. Holders are not paid interest but rather receive capital gains (the difference between the purchase price and the face value of the security). |
| Dividends | Dividends are a form of investment income to which shareholders become entitled as a result of placing funds at the disposal of corporations. |
| Dividends from public (financial and non-financial) corporations paid to general government | Dividends from public (financial and non-financial) corporations paid to general government represent property income earned by general government on its equity investment in these corporations. They are payable by public corporations from operating surpluses generated through the production process. Included are amounts in the nature of dividends such as transfers of profit, income tax equivalents and wholesale sales tax equivalents. |
| Domestic tourism consumption | Domestic tourism consumption consists of the tourism consumption by resident visitors on tourism related products within Australia. It is the sum of household tourism consumption and business and government tourism consumption. |
| Dwellings | Dwellings are buildings that are used entirely or primarily as residences, including any associated structures, such as garages, and all permanent fixtures customarily installed in residences. Houseboats, barges, mobile homes and caravans used as principal residences of households are also included, as are historic monuments identified primarily as dwellings. The costs of site clearance and preparation are also included in the value of dwellings. |

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| Economic flows | Economic flows reflect the creation, transformation, exchange, transfer or extinction of economic value. They involve changes in the volume, composition or value of an institutional unit's assets and liabilities. |
| Economic owner | The economic owner is the institutional unit entitled to claim the benefits associated with the use of the entity in question in the course of an economic activity by virtue of accepting the risk. |
| Economically significant prices | Economically significant prices are prices which have a significant influence on both the amounts producers are willing to supply and the amounts purchasers wish to buy. |
| Employees' social contributions | Social contributions payable by employees to private funded social insurance schemes. |
| Employers' contributions to superannuation | Employers' contributions to superannuation consist of social contributions payable by employers, for the benefit of their employees, to superannuation funds or other institutional units responsible for the administration and management of social insurance schemes. Although they are paid by the employer directly to the superannuation fund, the payments are made for the benefit of the employees. Accordingly, employees are treated as being remunerated by an amount equal to the value of the social contributions payable. |
| Employers' imputed social contributions | Some employers provide social benefits directly to their employees, former employees or their dependants from their own resources without involving an insurance enterprise or autonomous pension fund, and without creating a special fund or segregated reserve for the purpose. In the Australian context, employers' imputed social contributions primarily relate to unfunded superannuation schemes operated by the Commonwealth Government and State Governments. The remuneration imputed for such employees is equal in value to the amount of social contributions that would be needed to secure the de facto entitlements to the social benefits they accumulate. |
| Employers' social contributions | Employers' social contributions are payments by employers which are intended to secure for their employees the entitlement to social benefits should certain events occur, or certain circumstances exist, that may adversely affect their employees' income or welfare—namely work-related accidents and retirement. |
| Enterprise | The enterprise is an institutional unit comprising a single legal entity, or a grouping of legal entities, within an enterprise group, classifiable to the same institutional subsector, as per the Standard Institutional Sector Classification of Australia (SISCA). |
| Entertainment, literary or artistic originals | Entertainment, literary or artistic originals are original films, sound recordings, manuscripts, tapes, models, etc., on which drama performances, radio and television programming, musical performances, sporting events, literary and artistic output, etc. are recorded or embodied. Included are works produced on own-account. In some cases there may be multiple originals (e.g. films). |
| Entrepreneurial income | Entrepreneurial income for a corporation, quasi-corporation, or an institutional unit owning an unincorporated enterprise engaged in market production, is defined as its operating surplus (or mixed income), plus property income receivable on the assets owned by the enterprise, less interest payable on the liabilities of the enterprise and rents payable on non-produced non-financial natural resource assets (such as land) rented by the enterprise. |
| Equity | Equity has the distinguishing feature that the holders own a residual claim on the assets of the institutional unit that issued the equity. Equity represents the owner's funds in the institutional unit. |
| Exports of goods and services | The value of goods exported and amounts receivable from non-residents for the provision of services by residents. |
| External account | The external account records all current transactions between Australian residents and non-residents. |
| Final consumption expenditure – general government | Net expenditure on goods and services by public authorities, other than those classified as public corporations, which does not result in the creation of fixed assets or inventories or in the acquisition of land and existing buildings or second-hand assets. It |

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| | comprises expenditure on compensation of employees (other than those charged to capital works, etc.), goods and services (other than fixed assets and inventories) and consumption of fixed capital. Expenditure on repair and maintenance of roads is included. Fees, etc., charged by general government bodies for goods sold and services rendered are offset against purchases. Net expenditure overseas by general government bodies and purchases from public corporations are included. Expenditure on defence assets is classified as gross fixed capital formation. |
| Face value | The value that appears on the face of a debt security being the amount that the issuing entity promises to pay to the holder when the security matures. Also known as the nominal or par value. |
| Final consumption expenditure - households | Net expenditure on goods and services by persons and expenditure of a current nature by private non-profit institutions serving households. This item excludes expenditures by unincorporated businesses and expenditures on assets by non-profit institutions (included in gross fixed capital formation). Also excluded are maintenance of dwellings (treated as intermediate expenses of private enterprises), but personal expenditure on motor vehicles and other durable goods and the imputed rent of owner-occupied dwellings are included. The value of 'backyard' production (including food produced and consumed on farms) is included in household final consumption expenditure and the payment of wages and salaries in kind (e.g. food and lodging supplied free to employees) is counted in both household income and household final consumption expenditure. |
| Financial account | The financial account records the net acquisition of financial assets and net incurrence of liabilities for all institutional sectors, by type of financial asset. |
| Financial assets | Financial assets are mostly financial claims. Financial claims entitle the owner to receive a payment, or a series of payments, from an institutional unit to which the owner has provided funds. Shares are treated as financial assets even though the financial claim their holders have on the corporation is not a fixed or predetermined monetary amount. |
| Financial corporations | Financial corporations are mainly engaged in financial market transactions, which involve incurring liabilities and acquiring financial assets, i.e. borrowing and lending money, providing superannuation, life, health or other insurance, financial leasing or investing in financial assets. Also included are corporations providing financial auxiliary services. |
| Financial intermediation services indirectly measured (FISIM) | Banks and some other financial intermediaries are able to provide services for which they do not charge explicitly, by paying or charging different rates of interest to borrowers and lenders (and to different categories of borrowers and lenders). For example, they may pay lower rates of interest than would otherwise be the case to those who lend them money and charge higher rates of interest to those who borrow from them. The resulting net receipts of interest are used to defray their expenses and provide an operating surplus. This scheme of interest rates avoids the need to charge their customers individually for services provided and leads to the pattern of interest rates observed in practice. However, in this situation, the national accounts must use an indirect measure, namely FISIM, of the value of the services for which the intermediaries do not charge explicitly.<br><br>Whenever the production of output is recorded in the national accounts, the use of that output must be explicitly accounted for elsewhere in the accounts. Hence, FISIM must be recorded as being disposed of in one or more of the following ways: as intermediate consumption by enterprises; as final consumption by households or general government; or as exports to non-residents. |
| Fixed assets | Fixed assets are produced assets that are used repeatedly or continuously in production processes for more than one year. Fixed assets consist of dwellings, non-dwelling construction, machinery and equipment, weapons systems, cultivated biological resources, ownership transfer costs and intellectual property products. |
| Forward contract | A forward contract or forward rate agreements are arrangements in which two parties, in order to protect themselves against interest rate changes, agree on an interest rate to be paid, at a specified settlement date, on a notional amount of principal that is never exchanged. The only payment that takes place is related to the difference between the agreed forward rate and the prevailing market rate at the time of settlement. |

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| Friendly societies | These are mutual organisations whose members originally came from specific crafts or religions. They aim to provide their members with a wide range of cradle-to-grave services. Examples of these are: life, health, disability, funeral, and general insurances; investment services; financial services similar to those provided by credit unions; and retirement and travel services. |
| Futures contract | A futures contract is an agreement to buy/sell a standard quantity of a commodity - such as gold, $US or bank bills of exchange - on a specific future date at an agreed price determined at the time the contract is traded on the futures exchange. |
| Goods and services account | The goods and services account shows how all output from within the production boundary, plus imports, is accounted for in one of the other two basic activities of the ASNA, consumption (i.e. intermediate or final) of goods and services or accumulation (capital formation) of goods and services, plus exports. |
| Goods and services tax (GST) | The GST is a tax of 10 per cent on the price of most goods and services in Australia, including those that are imported. It does not apply to sales of goods or services that are either exempt (GST-free) or input-taxed. |
| Government actual final consumption | Government actual final consumption is equal to government final consumption expenditures on collective services such as defence. |
| Government units | Government units are unique types of legal entities established by political processes and having legislative, judicial or executive authority over other institutional units. |
| Gross disposable income – households | Gross disposable income—households is gross household income less income tax payable, other current taxes on income, wealth etc., consumer debt interest, interest payable by unincorporated enterprises and dwellings owned by persons, net non-life insurance premiums and other current transfers payable by households. |
| Gross domestic product | Gross domestic product is the total market value of goods and services produced in Australia within a given period after deducting the cost of goods and services used up in the process of production, but before deducting allowances for the consumption of fixed capital. Thus gross domestic product, as here defined, is 'at market prices'. It is equivalent to gross national expenditure plus exports of goods and services less imports of goods and services. |
| Gross farm product | Gross farm product is that part of gross domestic product which derives from production in agriculture and services to agriculture. |
| Gross fixed capital formation – general government | Expenditure on new fixed assets plus net expenditure on second-hand fixed assets, whether for additions or replacements. Expenditure on new roadworks (or on upgrading existing roads) is included, but expenditure on road repair and maintenance is classified as government final consumption expenditure. |
| Gross fixed capital formation – private corporations | Expenditure on fixed assets broken down into dwellings, non-dwelling construction, machinery and equipment, cultivated biological resources, intellectual property products and ownership transfer costs. The machinery and equipment category includes plant, machinery, equipment, vehicles, etc. Expenditure on repair and maintenance of fixed assets is excluded, being chargeable to the production account. Additions to fixed assets are regarded as capital formation. Also included is compensation of employees paid by private enterprise in connection with own-account capital formation. Expenditure on dwellings, non-dwelling construction, and machinery and equipment is measured as expenditure on new and second-hand assets, less sales of existing assets. Ownership transfer costs comprise stamp duty, real estate agents' fees and sales commissions, conveyancing fees and miscellaneous government charges. |
| Gross fixed capital formation – public corporations | Expenditure on new fixed assets plus net expenditure on second-hand fixed assets and including both additions and replacements. Also included is compensation of employees paid by public corporations in connection with capital works undertaken on own account. |
| Gross income – households | Gross income—households is the total income, whether in cash or kind, receivable by persons normally resident in Australia. It includes both income in return for productive activity (such as compensation of employees, the gross mixed income of unincorporated enterprises, gross operating surplus on dwellings owned by persons, |

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| | and property income receivable) and transfers receivable (such as social assistance benefits and non-life insurance claims). |
| Gross mixed income of unincorporated enterprises (GMI) | Gross mixed income of unincorporated enterprises is the term reserved for the surplus accruing to owners of unincorporated enterprises from processes of production (as defined for gross operating surplus) before deducting any explicit or implicit interest, rents or other property incomes payable on the financial assets, non-produced non-financial natural resource assets (such as land) required to carry on the production and before deducting consumption of fixed capital. However, GMI is measured after the deduction of FISIM and the insurance service charge. The owners, or other members of their households, may work without receiving any wage or salary. Mixed income therefore includes both gross operating surplus for unincorporated enterprises and returns for the proprietors' own labour (akin to wages and salaries). In practice, all unincorporated enterprises owned by households that are not quasi-corporations are deemed to fall into this category, except owner-occupiers in their capacity as producers of housing services for own final consumption, and households employing paid domestic staff (an activity which is deemed to generate zero surplus). |
| Gross national disposable income (GNDI) | Gross national disposable income (GNDI) is equivalent to gross national income plus all secondary income in cash or in kind receivable by resident institutional units from the rest of the world, less all secondary income in cash or in kind payable by resident institutional units to the rest of the world. |
| Gross national expenditure (GNE) | Gross national expenditure (GNE) is the total expenditure within a given period by Australian residents on final goods and services (i.e. before allowances for capital goods and services used up during the period in the process of production). It is equivalent to gross domestic product plus imports of goods and services less exports of goods and services. |
| Gross national income (GNI) | Gross national income (GNI) is the aggregate value of gross primary incomes for all institutional sectors, including net primary income receivable from non-residents. |
| Gross non-farm product | Gross non-farm product arises from production in all industries other than agriculture. |
| Gross operating surplus (GOS) | Gross operating surplus is a measure of the surplus accruing to owners from processes of production before deducting any explicit or implicit interest charges, rents or other property incomes payable on the financial assets, non-produced non-financial natural resource assets (such as land) required to carry on the production and before deducting consumption of fixed capital. However, GOS is measured after the deduction of FISIM and the insurance service charge. It excludes gross mixed income which is the surplus accruing to owners of unincorporated enterprises. Gross operating surplus is also calculated for general government, where it equals general government's consumption of fixed capital. |
| Gross State Product (GSP) | Gross State Product (GSP) is defined equivalently to Gross Domestic Product (GDP) but refers to production within a state or territory rather than to the nation as a whole. See Gross Domestic Product (GDP). |
| Gross value added | Gross value added is defined as the value of output at basic prices minus the value of intermediate consumption at purchasers' prices. The term is used to describe gross product by industry and by sector. Basic prices valuation of output removes the distortion caused by variations in the incidence of commodity taxes and subsidies across the output of individual industries. |
| Household | A household is a group of persons who share the same living accommodation, who pool some, or all, of their income and wealth and who consume certain types of goods and services collectively, mainly housing and food. |
| Household claims on technical reserves of life insurance corporations and pension funds | This represents households' net equity in, or claims on, the reserves of life insurance corporations and pension funds. In the case of life insurance corporations, it equates in large measure with the net policy liabilities of life offices to households. In the case of pension funds, it represents the funds' obligations to members including any surpluses and reserves. A claim by householders on insurance technical reserve of non-resident pension funds is also included. |
| Household actual final consumption | Household actual final consumption includes: the value of the households expenditures on consumption goods and services including expenditures on non-market goods or |

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| | services sold at prices that are not economically significant; government final consumption expenditures on education, health, social security and welfare, sport and recreation and culture, which are considered to be individual services; and services provided by non-profit institutions serving households as they are treated as individual services. |
| Household production for own final use | Household production for own final use is defined as those productive activities that result in goods or services consumed or capitalised by the households that produce them. |
| Household tourism consumption | Household tourism consumption consists of the tourism consumption by resident households on tourism related products within Australia. |
| Household saving ratio | The ratio of household net saving to household net disposable income. Household net saving is calculated as household net disposable income less household final consumption expenditure. Household net disposable income is calculated as household gross disposable income less household consumption of fixed capital. |
| Illegal production | Illegal production is:<br>• the production of goods or services whose sale, distribution or possession is forbidden by law; and<br>• production activities that are usually legal but become illegal when carried out by unauthorized producers; for example, unlicensed medical practitioners. |
| Implicit price deflator (IPD) | An IPD is obtained by dividing a current price value by its real counterpart (the chain volume measure). When calculated from the major national accounting aggregates, such as gross domestic product, IPDs relate to a broader range of goods and services in the economy than that represented by any of the individual price indexes published by the Australian Bureau of Statistics. Movements in an implicit price deflator reflect both changes in price and changes in the composition of the aggregate for which the deflator is calculated. |
| Imports of goods and services | The value of goods imported and amounts payable to non-residents for the provision of services to residents. |
| Imputed tourism consumption | Imputed tourism consumption consists of imputations made for the consumption by visitors of certain goods and services for which they do not make a payment. Imputation is confined to a small number of cases where a reasonably satisfactory basis for the valuation of the implied transaction is available, and where their inclusion is consistent with the production boundary in the core national accounts. |
| Income tax | Income tax consists of taxes on the income of households, corporations and non-residents, and taxes on wealth which are levied regularly (wealth taxes which are levied irregularly are classified as capital taxes and are recorded in the sectoral capital accounts). |
| Income account | The income account shows how gross disposable income is used for final consumption expenditure and the consumption of fixed capital (depreciation), with the balance being net saving.<br><br>Income flows are divided into primary income and secondary income. Primary incomes are incomes that accrue to institutional units as a consequence of their involvement in processes of production or ownership of assets that may be needed for purposes of production. Secondary incomes are incomes that are redistributed between institutional units by means of payments and receipts of current transfers. Income redistribution also includes social transfers in kind. |
| Indirect allocation of imports | The indirect allocation method of recording imports includes those imports in the intermediate use of industries and in the final use categories without distinguishing the imports from the products with which they compete. This allows the intermediate use matrix to fully reflect the input structures of industries. With this method the imports are also listed under the industries' use of primary inputs, but after deriving total production. |
| Indirect requirement | The chain of calculations of output requirements can be continued beyond the direct requirements of an industry. For example, in order to produce output from the chemicals industry, inputs are required directly from the mining industry. Tor produce |

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| | this indirect requirement of the mining industry, the chemical industry needs, in turn, additional output from the mining industry, and so on in a convergent infinite series. The example has been confined to two industries directly dependent on each other, but indirect requirements can arise even in the absence of direct dependence. For example, the mining industry may not directly require any inputs from agriculture, but it requires inputs from chemicals which cannot be satisfied without input from agriculture. Therefore, there is an indirect requirement by mining for agricultural input. |
| Individual consumption | An individual consumption good or service is one that is acquired by a household and used to satisfy the needs and wants of members of that household. Individual goods and services can always be bought and sold on the market, although they may also be provided free, or at prices that are not economically significant, or as transfers in kind. Individual goods and services are essentially 'private', as distinct from 'public'. |
| Industry | An industry consists of a group of establishments engaged in the same, or similar kinds, of activity. |
| Informal sector production | The informal sector is defined as:<br>• consisting of units engaged in the production of goods or services with the primary objective of generating employment and incomes to the persons concerned; and<br>• production units have the characteristic features of household enterprises.<br>Therefore, informal sector production is defined as those productive activities conducted by unincorporated enterprises in the household sector that are unregistered and/or less than a specified size in terms of employment and that have some market production |
| Input-Output Industry Group (IOIG) | IOIGs are based on the Australian and New Zealand Standard Industrial Classification (ANZSIC) and the I-O tables are published at this level of industry. |
| Input-Output Product Classification (IOPC) | The IOPC is the detailed level product classification, organised according to the industry to which each product is primary. I-O tables are compiled at this level of product classification. |
| Input-Output Product Group (IOPG) | IOPGs are groups of IOPCs aggregated to the IOIGs to which they are primary. I-O tables are published at this level of product classification. |
| Input-output tables | Input and output tables are a means of presenting a detailed analysis of the process of production and the use of goods and services (products) and the income generated in the production process; they can be either in the form of (a) supply and use tables or (b) symmetric input and output tables. |
| Inscribed stock | Debt securities whose issuer maintains a register of current holders. Accordingly, settlement of transactions (trades) in these securities is affected by assignment (marked transfer), not delivery. |
| Institutional sectors | The resident units that make up the total economy are grouped into four mutually exclusive institutional sectors, namely: the non-financial corporations sector; the financial corporations sector; the general government sector; and the household sector, which includes non-profit institutions serving households. |
| Institutional units | An institutional unit is an economic entity that is capable, in its own right, of owning assets, incurring liabilities, and engaging in economic activities and in transactions with other entities. There are two main types of institutional units, namely persons or groups of persons in the form of households, and legal or social entities whose existence is recognised by law or society independently of the persons, or other entities, that may own or control them. The individual members of multi-person households are not treated as separate institutional units. Legal or social entities that engage in economic activities in their own right, such as corporations, NPIs or government units, are considered institutional units as they are responsible and accountable for the economic decisions or actions they take. |
| Insurance service charge | Insurance service charge is the imputed charge for the service of arranging the financial protection or security which insurance is intended to provide. This is not separately charged by insurance enterprises. |
| Insurance technical | Insurance technical reserves comprise financial assets that are reserves against |

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| reserves | outstanding risks, reserves for with-profit insurance, prepayments of premiums and reserves against outstanding claims. Insurance technical reserves may be liabilities not only of life or non-life insurance enterprises (whether mutual or incorporated) but also of autonomous pension funds, which are included in the insurance enterprise subsector, and certain non-autonomous pension funds that are included in the institutional sector that manages the funds. Insurance technical reserves are subdivided between net equity of households on life insurance reserves and on pension funds, and prepayments of premiums and reserves against outstanding claims. |
| Intellectual property products | Intellectual property products are as a result of research and development, investigation or innovations leading to knowledge that the developers can market or use for their own benefit. These are produced fixed assets and include computer software, research and development, entertainment, literary or artistic originals, and mineral exploration intended to be used for more than a year. |
| Interest | Interest is receivable by the owners of financial assets such as deposits, loans, and securities other than shares for putting the financial asset at the disposal of another institutional unit. |
| Intermediate consumption | Intermediate consumption consists of the value of the goods and services consumed as inputs by a process of production, excluding the consumption of fixed capital. |
| Internal tourism consumption | Internal tourism consumption consists of all tourism consumption of visitors, both resident and non-resident, within Australia. It is the sum of domestic tourism consumption and international tourism consumption. |
| International tourism consumption | International tourism consumption consists of the tourism consumption with Australia by non-residents on tourism related products. It is also referred to as internal tourism consumption by international visitors. |
| Intra-industry flows | Intra-industry flows refer to the production by units in an industry and use of that production by other units within the same industry. Australian I-O tables include the values of these flows. |
| Inventories | Inventories consist of stocks of outputs that are held at the end of a period by the units that produced them prior to their being further processed, sold, delivered to other units or used in other ways, and stocks of products acquired from other units that are intended to be used for intermediate consumption or for resale without further processing. |
| Labour productivity | Labour productivity estimates are indexes of real GDP per person employed or per hour worked. The estimates in the ASNA have been derived by dividing the chain volume measure of GDP by hours worked. Labour productivity indexes not only reflect the contribution of labour to changes in product per labour unit, but are also influenced by the contribution of capital and other factors affecting production. |
| Land | Land consists of the ground, including the soil covering and any associated surface waters, over which ownership rights are enforced and from which economic benefits can be derived by their owners by holding or using them |
| Legal entity | A legal entity is defined as a unit covering all the operations in Australia of an entity which possesses some or all of the rights and obligations of individual persons or corporations, or which behaves as such in respect of those matters of concern for economic statistics. |
| Legal owner | The legal owner of entities such as goods and services, natural resources, financial assets and liabilities is the institutional unit entitled in law and sustainable under the law to claim the benefits associated with the entities. |
| Liability | A liability is an obligation which requires one unit (the debtor) to make a payment or a series of payments to the other unit (the creditor) in certain circumstances specified in a contract between them. |
| Listed shares | Listed shares are equity securities listed on an exchange. |
| Livestock | Livestock assets are classified as either fixed assets or inventories. Those livestock which are used in production of other products (e.g. breeding stock, animals for |

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| | entertainment, sheep for wool and dairy cattle) are fixed assets. Inventories cover all other livestock types and include those animals raised for meat or other one-off products (e.g. leather). |
| Loans | Loans are borrowings which are not evidenced by the issue of debt securities, and are not usually traded and their value does not decline even in a period of rising interest rates. |
| Long-term debt securities | Long-term debt securities are debt securities with an original term to maturity of more than one year. They include Treasury bonds, semi-government securities, corporate securities, asset backed bonds and convertible notes prior to conversion. Long-term debt securities also include subordinated debt. |
| Machinery and equipment | Machinery and equipment includes transport equipment and other machinery and equipment, other than that acquired by households for final consumption. Tools that are relatively inexpensive and purchased at a relatively steady rate, such as hand tools, are excluded. Also excluded are machinery and equipment integral to buildings such as lifts, these being included in dwellings and non-residential buildings.<br><br>Machinery and equipment acquired by households for final consumption (e.g. motor vehicles) are not treated as fixed assets. However, they are included in the memorandum item 'consumer durables' in the balance sheet for households. Houseboats, barges, mobile homes and caravans used by households as principal residences are included in dwellings. |
| Margins | If the transactions are valued at basic prices, the margins are recorded as intermediate consumption (e.g. transport, wholesale trade) of the intermediate users or final buyers. If transactions are valued at purchasers' prices the value of margins in included, along with taxes less subsidies on products with the purchasers' price of the good to which the margin relates. |
| Market output | Output that is sold at prices that are economically significant or otherwise disposed of on the market, or intended for sale or disposal on the market. |
| Market sector | The 'market sector' is defined to include all industries except for Public administration and safety (O); Education and training (P); Health care and social assistance (Q) and Ownership of dwellings. |
| Mineral exploration | Mineral exploration is the value of expenditures on exploration for petroleum and natural gas and for non-petroleum mineral deposits. These expenditures include pre-licence costs, licence and acquisition costs, appraisal costs and the costs of actual test drilling and boring, as well as the costs of aerial and other surveys, transportation costs etc., incurred to make it possible to carry out the tests. |
| Monetary gold | Monetary gold is treated as a financial asset. Monetary gold is gold owned by monetary authorities (or others subject to effective control by monetary authorities) that is held as a financial asset and as a component of official reserves. Other gold held by any entity (including non-reserve gold held by monetary authorities and all gold held by financial institutions other than the central bank) is treated as a commodity. |
| Monetary transaction | Monetary transactions occur when the institutional units involved make or receive payments, or incur liabilities or receive assets denominated in units of currency. |
| Money market funds (MMFs) | Money market funds invest in transferable debt instruments with a residual maturity of not more than one year, bank deposits and instruments that pursue a rate of return that approaches the interest rates of money market instruments |
| Multifactor productivity | Multifactor productivity estimates are indexes of real GDP per combined unit of labour and capital. They have been derived by dividing chain volume estimates of market sector GDP by a combined measure of hours worked and capital services. |
| National saving | Calculated as the sum of the net saving of each of the resident sectors - households and unincorporated enterprises, non-financial corporations, financial corporations and general government. |
| Natural resources | Natural resources are non-produced non-financial assets consisting of land, subsoil assets, native standing timber and radio spectra. |

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| Net domestic product | Calculated as GDP less consumption of fixed capital. |
| Net equity in reserves | Net equity in reserves represents policy-holders' claims on life insurance businesses and pension funds. These technical reserves are calculated by deducting all repayable liabilities from the value of total assets. |
| Net errors and omissions | Net errors and omissions is the difference between net lending or borrowing in the capital account and the net change in financial position in the financial account. |
| Net lending(+)/Net borrowing (-) | The residual item in the capital account which shows each sector's net acquisition of financial assets. It is calculated as Gross saving and capital transfers less Total capital accumulation. In concept it is the same as the item Net change in financial position in the financial account. |
| Net lending to non-residents | Net lending to non-residents is the excess of net acquisition of financial assets in the rest of the world by resident institutional units over their net incurrence of liabilities in the rest of the world. |
| Net non-life insurance premiums | Net non-life insurance premiums are defined as non-life insurance premiums plus premium supplements less the non-life insurance service charge. |
| Net saving – corporations | Net saving—corporations is equal to the gross income receivable by corporations less income payable and consumption of fixed capital. Income receivable by corporations includes gross operating surplus, property income and current transfers receivable. Income payable includes property income and current transfers (including income taxes) payable. |
| Net saving – general government | Net saving—general government is the surplus of general government gross income over current use of income. Current use of income includes final consumption expenditure and current transfers (interest and other property income payable, social assistance benefits payments to residents, transfers to non-profit institutions, subsidies, etc.). |
| Net saving – households | Net saving—households is equal to gross household disposable income less household final consumption expenditure and consumption of fixed capital. Household saving is estimated as the balancing item in the households income account. It includes saving through life insurance and pension funds (including net earnings on these funds), increased equity in unfunded superannuation schemes. |
| Net secondary income from non-residents | Net secondary income from non-residents comprises all transfers to or from non-residents to resident government or private institutional units which are not payments for goods and services, compensation of employees or property income. |
| Net worth | In the national and sectoral balance sheets, net worth represents the difference between the stock of assets (both financial and non-financial) and the stock of liabilities (including shares and other equity). |
| Neutral holding gains/losses | The value of the holding gain that would accrue if the price of the asset changed in the same proportion as the general price level. |
| Nominal holding/gains losses | On a given quantity of asset, it is the value of the benefit accruing to the owner of that asset as a result of a change in its price or, more generally, its monetary value, over time. |
| Non-dwelling construction | Non-dwelling construction consist of non-residential buildings and other structures. 'Non-residential buildings' are buildings other than dwellings, including fixtures, facilities and equipment that are integral parts of the structures and costs of site clearance and preparation.<br><br>'Other structures' are structures other than buildings, including streets, sewers and site clearance and preparation other than for residential or non-residential buildings. Also included are shafts, tunnels and other structures associated with mining subsoil assets. Major improvements to land, such as dams, are also included. |
| Non-financial assets | Non-financial assets are assets for which no corresponding liabilities are recorded. |
| Non-financial corporations | Non-financial corporations are corporations whose principal activity is the production of |

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| | market goods or non-financial services. |
| Non-life insurance claims | Non-life insurance claims are the claims payable in settlement of damages that result from an event covered by a non-life insurance policy in the current accounting period. |
| Non-market output | Goods and services produced by any institutional unit that are supplied free or at prices that are not economically significant. |
| Non-monetary transactions | Non-monetary transactions are transactions that do not involve the exchange of cash, or assets or liabilities that are not denominated in units of currency. |
| Non-money market financial investment funds (NMMF) | Non-money market financial investment funds (NMMF) invest in financial assets other than short-term assets. |
| Non-observed economy (NOE) | The NOE refers to economic activities that are often missing from the data sources used to compile the national accounts. |
| Non-produced assets | Non-produced assets are non-financial assets that come into existence other than through processes of production. Non-produced assets that occur in nature is where ownership has been enforced or transferred. Environmental assets over which ownership rights have not, or cannot, be enforced, such as international waters or air space, are excluded. They consist of Natural resources (such as land, subsoil assets, native standing timber and radio spectra); Contracts, leases and licences; and Purchased goodwill and marketing assets. Purchased goodwill and marketing assets are not included in the ASNA. |
| Non-produced non-financial natural resource asset | Non-produced assets that occur in nature over which ownership rights have been enforced, such as land, subsoil assets, native standing timber and radio spectra. |
| Non-profit institutions | Non-profit institutions are legal or social entities created for the purpose of producing goods or services whose status does not permit them to be a source of income, profit or other financial gain for the units that establish, control or finance them. |
| One-name paper | One name paper includes promissory notes, treasury notes and certificate of deposits issued by banks. |
| Options | Options are contracts that give the purchaser the right, but not the obligation, to buy (a 'call' option) or to sell (a 'put' option) a particular financial instrument or commodity at a predetermined price (the 'strike' price) within a given time span (American option) or on a given date (European option). |
| Orchards | Orchards are any plants that can produce a marketable quantity of fruit for more than one year in which the grower intends to obtain a future benefit from the sale of the fruits borne. It can include trees, vines, bushes and shrubs. The costs to be capitalised as part of the value of fruit and nut bearing plants are the establishment costs involved in planting the new nursery plant and then maintenance costs associated with making the plant grow. |
| Other accounts receivable/payable | This term is used in two ways. Firstly it is the financial asset consisting of two subordinate classifications: 'trade credit and advances', and 'other accounts receivable/payable'. Alternatively, the item can refer to the actual classification 'other accounts receivable/payable'.<br><br>Accounts receivable and payable include items other than those in the previous paragraph (e.g. in respect of taxes, dividends, purchases and sales of securities, rent, wages and salaries and social contributions). Interest accruing that is not capitalised in the underlying asset may be included. |
| Other changes in real net wealth | Calculated as the sum of real holding gains, net capital transfers and other changes in volume. |
| Other changes in real net wealth – other differences | These arise due to a different treatment of stock and flow concepts between the balance sheet and capital account estimates. Net capital formation in the balance sheet includes additional components of cultivated biological resources (all animals and not just cattle and sheep as shown in the capital stock tables), livestock and plantation standing timber |

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| | inventories. These are included in the change in net worth in the balance sheet and excluded from the capital account. |
| Other changes in the volume of assets | Other changes in the volume of assets are changes in the value of assets and liabilities over the accounting period arising from events other than transactions and revaluations. |
| Other current taxes on income, wealth etc. | Other current taxes on income, wealth etc. consists mainly of payments by households to obtain licences to own or use vehicles, boats or aircraft, and for licences to hunt, shoot or fish. |
| Other current transfers | Other current transfers consist of all current transfers between resident institutional units or between resident and non-resident units other than current taxes on income, wealth, etc. and social benefits in kind. |
| Other deposits | Other deposits comprise all claims, other than transferable deposits, that are represented by evidence of deposit. Typical forms of deposits that should be included are savings deposits (which are always non-transferable), fixed-term deposits and non-negotiable certificates of deposit. |
| Other flows | Other flows are changes in the value of assets and liabilities that do not take place through transactions. They are either other changes in the volume of assets or liabilities, or holding gains and losses. |
| Other subsidies on production | Other subsidies on production consist of all subsidies, except subsidies on products, which resident enterprises may receive as a consequence of engaging in production. Other subsidies on production include: subsidies related to the payroll or workforce numbers (including subsidies payable on the total wage or salary bill), on numbers employed, or on the employment of particular types of persons, e.g. persons with disabilities or persons who have been unemployed for a long period. |
| Other taxes on production | Other taxes on production consist of all taxes that enterprises incur as a result of engaging in production, except taxes on products. Other taxes on production include: taxes related to the payroll or workforce numbers excluding compulsory social security contributions paid by employers and any taxes paid by the employees themselves out of their wages or salaries; recurrent taxes on land, buildings or other structures; some business and professional licences where no service is provided by the Government in return; taxes on the use of fixed assets or other activities; stamp duties; taxes on pollution; and taxes on international transactions. |
| Outbound tourism consumption | Outbound tourism consumption consists of the tourism consumption by resident visitors outside of Australia while on an international trip. It is also referred to as tourism imports. |
| Output | Output consists of those goods and services that are produced within an establishment that become available for use outside that establishment, plus any goods and services produced for own final use. |
| Output for own final use | Output for own final use includes output for own final consumption and output for own gross fixed capital formation. |
| Ownership transfer costs | The costs of ownership transfer consist of the following kinds of items: all professional charges, taxes payable or commissions incurred by the units acquiring and disposing of the asset (e.g. fees paid to lawyers, architects, surveyors, engineers, valuers, etc., and commissions paid to estate agents, auctioneers, etc.). The assets on which ownership transfer costs may apply include dwellings, non-dwelling buildings and land. |
| Payments in kind | Payments in kind occur when an employee accepts payment from an employer in the form of goods and services instead of money (or some other financial asset). |
| Pension fund claims on life insurance corporations reserves | This category represents pension funds' net equity in, or claims on, life insurance corporation reserves. |
| Perpetual inventory model (PIM) | The PIM is a method of constructing estimates of capital stock and consumption of fixed capital from time series of gross fixed capital formation. It allows an estimate to be made of the stock of fixed assets in existence and in the hands of producers which is generally based on estimating how many of the fixed assets, installed as a result of gross fixed |

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| | capital formation undertaken in previous years, have survived to the current period. |
| Placements | Placements are customers' account balances with entities not regarded as deposit-taking institutions. Examples are account balances of State and local public non-financial corporations with their central borrowing authorities, of public sector pension funds with their State Treasuries, and 11am money placed with corporate treasuries. |
| Prepayments of premiums and reserves against outstanding claims | Prepayments of premiums and reserves against outstanding claims are reserves in the form of prepayments of premiums which result from the fact that, in general, insurance premiums are paid in advance. Such reserves are assets of the policy-holders.<br><br>Reserves against outstanding claims are reserves that insurance enterprises hold in order to cover the amounts they expect to pay out in respect of claims that are not yet settled or claims that may be disputed. Reserves against outstanding claims are considered to be assets of the beneficiaries. |
| Primary incomes | Primary incomes are incomes that accrue to institutional units as a consequence of their involvement in processes of production or ownership of assets that may be needed for purposes of production. They are payable out of the value added created by production. The primary incomes that accrue by lending or renting financial or non-produced non-financial natural resource assets, including land, to other units for use in production are described as 'property incomes'. Receipts from taxes on production and imports are treated as primary incomes of governments even though not all of them may be recorded as payable out of the value added of enterprises. Primary incomes exclude social contributions and benefits, current taxes on income, wealth, etc. and other current transfers. |
| Primary inputs | Primary inputs include compensation of employees, gross operating surplus and gross mixed income, taxes less subsidies on products, other taxes less subsidies on production and imports. |
| Primary input content | The primary input content per $100 of use by an industry shows the ultimate content (resulting from total requirements) of each primary input in $100 of that industry's use. |
| Produced assets | Produced assets are non-financial assets that have come into existence as outputs from production processes. Produced assets consist of fixed assets, inventories and valuables. However, valuables are not included in the ASNA. |
| Producers' prices | The producers' price is the amount receivable by the producer from the purchaser for a unit of a good or service. |
| Production account | Production accounts record the expenses incurred in production and the receipts from sales of goods and services. |
| Productivity growth cycles | A common method of examining changes in productivity over an extended period involves identifying and dividing the data into productivity 'growth cycles'. Year to year changes in measured productivity may reflect changes that are conceptually distinct from the notion of productivity. By analysing averages of productivity statistics between growth cycle peaks, the effects of some of these temporary influences can be minimised, allowing better analysis of the drivers of productivity growth in different periods. Productivity growth cycle peaks are determined by comparing the annual MFP estimates with their corresponding long-term trend estimates. The peak deviations between these two series are the primary indicators of a growth-cycle peak, although general economic conditions at the time are also considered. |
| Property income | Property income is the income receivable by the owner of a financial asset or a non-produced non-financial natural resource asset in return for providing funds to, or putting the non-produced non-financial natural resource asset at the disposal of, another institutional unit. Property incomes are received by the owners of financial assets and non-produced non-financial natural resource assets (mainly land and subsoil assets). Institutional units with funds to invest do so by lending them to other institutional units. As a result, financial assets are created, the owners of which are entitled to receive property incomes in the form of interest and dividends. Owners of land and subsoil assets may put these assets at the disposal of other units by arranging contracts or leases under which the tenants, or users of the assets, agree to pay to the owners property incomes in the form of rent. |

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| Property income flows attributable to insurance policy holders | Property income flows attributable to insurance policy holders include imputed flows relating to life insurance, superannuation and non-life insurance operations. These include imputed interest from life insurance and pension funds to households; premium supplements which are an imputed property income flow from non-life insurance corporations to policy-holders; and imputed interest from the general government sector to households, which is recorded on the account of the unfunded superannuation schemes operated by the general government sector. |
| Public unit trust | A trust which issues units to the general public within Australia for the purpose of investing the pooled monies. A public unit trust must have registered a prospectus with the Australian Securities and Investments Commission and be governed by a trust deed between its management company and a trustee company. The units may or may not be listed on the Australian Securities Exchange. |
| Purchased goodwill and marketing assets | The difference between the value paid for an enterprise as a going concern and the sum of its assets less the sum of its liabilities. It is a non-produced non-financial asset. It is not included in the ASNA. |
| Purchasers' prices | The purchaser's price is the amount paid by the purchaser, excluding any deductible tax, in order to take delivery of a unit of a good or service at the time and place required by the purchaser. The purchaser's price of a good includes any transport charges paid separately by the purchaser to take delivery at the required time and place. |
| Quasi-corporations | Quasi-corporations are unincorporated enterprises that function as if they were corporations. Three main kinds of quasi-corporations are recognised by the 2008 SNA, namely: an unincorporated enterprise owned by government units engaged in market production and operated in a similar way to publicly owned corporations; unincorporated enterprises, including unincorporated partnerships, owned by households, which are operated as if they were privately owned corporations; and unincorporated enterprises which belong to institutional units resident abroad such as permanent branches, or offices of production units belonging to foreign enterprises which engage in significant amounts of production over long, or indefinite, periods of time. |
| Real gross domestic income | Real gross domestic income measures the purchasing power of the total incomes generated by domestic production.<br><br>It is calculated by:<br>• taking the volume measure of gross national expenditure (GNE)<br>• adding exports of goods and services at current prices deflated by the implicit price deflator for imports of goods and services<br>• deducting the volume measure of imports of goods and services<br>• adding the current price statistical discrepancy for GDP(E) deflated by the implicit price deflator for GDP.<br><br>In the derivation of the aggregate, all of the adjustments are made using the chain volume aggregation method used to derive all of the ABS chain volume estimates. |
| Real gross national income | Real gross national income (RGNI) is the real aggregate value of gross primary incomes for all institutional sectors, including net primary income receivable from non-residents.<br><br>It is calculated by adjusting real gross domestic income for the real impact of primary income flows (property income and labour income) to and from overseas. |
| Real holding gains | A real holding gain/loss is the difference between the nominal holding gain/loss on assets and liabilities, and the neutral holding gain. It is the value of the additional command over real resources accruing to the holder of an asset as a result of a change in its price relative to the prices of goods and services in the economy. |
| Real net national disposable income | Real net national disposable income is calculated by:<br>▪ taking real gross domestic income<br>▪ deducting real incomes payable to the rest of the world<br>▪ adding real incomes receivable from the rest of the world<br>▪ deducting the volume measure of consumption of fixed capital.<br><br>Real incomes payable and receivable are calculated by dividing the nominal income |

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| | flows by the implicit price deflator for gross national expenditure. In the derivation of the aggregate, all of the adjustments are made using the chain volume aggregation method used to derive all of the ABS chain volume estimates. |
| Re-exports | Re-exports are goods imported into Australia and then exported without having been used or transformed in any way. |
| Reference period | In connection with price or volume indexes, the reference period means the period to which the indexes relate. It is typically set equal to 100 for price indexes and to the corresponding current price values of the reference year for volume indexes, and it does not necessarily coincide with the base period. |
| Reinvested earnings | Reinvested earnings are imputed transactions related to that component of income that is not distributed to equity and or unit holders in direct foreign investment enterprises, and resident and non-resident investment funds in the form of dividends. |
| Rent on natural resources | Rent on natural resources is the income receivable by the owner of a natural resource (the lessor or landlord) for putting the natural resource at the disposal of another institutional unit (a lessee or tenant) for use of the natural resource in production. |
| Repo | A repurchase agreement (repo) involves the sale of securities or other assets with a commitment to repurchase equivalent assets at a specified date. |
| Research and development | Research and development (R&D) is creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and to enable this stock of knowledge to be used to devise new applications. It is included in Intellectual property products as a produced fixed asset. |
| Residence | The residence of each institutional unit is the economic territory with which it has the strongest connection, in other words, its centre of predominant economic interest. |
| Rest of the world | The rest of the world consists of all non-resident institutional units that enter into transactions with resident units, or have other economic links with resident units. |
| Revaluations | Revaluations are holding gains or losses arising from changes in the market prices of assets and liabilities during the accounting period. |
| Secondary income | Secondary income consists of receipts and payments of current transfers. |
| Services from consumer durables | Represents the value of services provided by consumer durables to the household in the accounting period. It arises because consumer durables, unlike other final consumption goods, are not used up in the accounting period in which they are purchased. It is measured in the same way as consumption of fixed capital, i.e. as the reduction in value of the stock of consumer durables during the accounting period resulting from physical deterioration, normal obsolescence or normal accidental damage. Unforeseen obsolescence is not taken into account.<br><br>Ideally, the service flow would be calculated in a manner analogous to the estimation of flows of capital services within the general capital stock model. Flows of capital services and flows of consumption of fixed capital are related but different concepts. Capital services relate to the changing efficiency of an asset whereas depreciation relates to the changing price of an asset. |
| Short-term debt securities | Short-term debt securities are debt securities with an original maturity of one year or less. They include bills of exchange, promissory notes (also called 'one name paper'), Treasury notes and bank certificates of deposit. |
| Social assistance benefits | Social assistance benefits are current transfers payable to households by government units to meet the same needs as social insurance benefits, but which are not made under a social insurance scheme incorporating social contributions and social insurance benefits. They may be payable in cash or in kind. In Australia, they include the age pension and unemployment benefits. |
| Social assistance benefits in cash to residents | Social assistance benefits in cash to residents include current transfers to persons from general government in return for which no services are rendered or goods supplied. Principal components include: scholarships; maternity, sickness and unemployment benefits; child endowment and family allowances; and widows', age, invalid and |

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| | repatriation pensions. |
| Social benefits | Social benefits are current transfers received by households and are intended to provide for needs arising from certain events or circumstances, e.g. sickness, unemployment, retirement, housing, education or family circumstances. There are two kinds of social benefits: social insurance benefits; and social assistance benefits. |
| Social contributions | Social contributions are actual or imputed payments to social insurance schemes to make provision for social insurance benefits to be paid. They may be made by employers on behalf of their employees; or by employees, self-employed or non-employed persons on their own behalf. |
| Social insurance benefits | Social insurance benefits are transfers provided under organised social insurance schemes. Organised social insurance schemes provide benefits through general social security schemes, privately funded social insurance schemes, or unfunded schemes managed by employers for the benefit of their existing or former employees without involving third parties in the form of insurance enterprises or pension funds. |
| Social transfers in kind | Social transfers in kind are individual goods and services provided to individual households by general government units and non-profit institutions either free or at prices that are not economically significant. |
| Special Drawing Rights (SDRs) | Special Drawing Rights (SDRs) are financial assets. In Australia, the SDR allocation is recorded by the central government and the SDR asset is recorded by the Reserve Bank of Australia (RBA). The RBA has a deposit liability to the central government.<br><br>SDRs are international reserve assets created by the International Monetary Fund (IMF) and allocated to its member States to supplement existing reserve assets. |
| Specialisation ratio (for an industry) | An industry may produce a number of products, some of which may be primary to that industry and some of which may be primary to other industries. The specialisation ratio shows the proportion of an industry's output that is primary to that industry. |
| Statistical discrepancy I, E and P | For years in which a balanced S-U table is available to benchmark the national accounts, the same measure of GDP is obtained regardless of whether one sums incomes, expenditures or gross value added for each industry. For other years, however, statistical discrepancies between the measures remain. The differences between those three separate estimates and the single measure of GDP for those years are called statistical discrepancy (I), statistical discrepancy (E) and statistical discrepancy (P), respectively. |
| Stock lending | The terms securities lending or stock lending are used in securities markets to describe arrangements whereby issuers or asset-holders or both (called stock lenders) provide securities to other market participants (called stock borrowers) in return for a fee. |
| Subsidies on products | A subsidy on a product is a subsidy payable per unit of a good or service. The subsidy may be a specific amount of money per unit of quantity of a good or service, or it may be calculated ad valorem as a specified percentage of the price per unit. A subsidy may also be calculated as the difference between a specified target price and the market price actually paid by a purchaser. A subsidy on a product usually becomes payable when the product is produced, sold or imported, but it may also become payable in other circumstances, such as when a product is exported, leased, transferred, delivered or used for own consumption or own capital formation. |
| Supply and use tables | Supply and use tables are in the form of matrices that record how supplies of different kinds of goods and services originate from domestic industries and imports, and how those supplies are allocated between various intermediate or final uses, including exports. |
| Swaps | Swaps are contractual arrangements between two parties who agree to exchange, according to predetermined rules, streams of payment on the same amount of indebtedness over time. The two most prevalent varieties are interest rate swaps and currency swaps. For example, an interest rate swap involves an exchange of interest payments of different character, such as fixed rates for floating rate, two different floating rates, fixed rate in one currency and floating rate in another etc. |
| Taxes on production and | Taxes on production and imports consist of 'taxes on products' and 'other taxes on |

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| imports | production'. These taxes do not include any taxes on the profits or other income received by an enterprise. They are payable irrespective of the profitability of the production process. They may be payable on the land, fixed assets or labour employed in the production process, or on certain activities or transactions. |
| Tax on products | A tax on a product is a tax that is payable per unit of some good or service. The tax may be a specific amount of money per unit of quantity of a good or service (quantity being measured either in terms of discrete units or continuous physical variables such as volume, weight, strength, distance, time, etc.), or it may be calculated ad valorem as a specified percentage of the price per unit or value of the goods or services transacted. A tax on a product usually becomes payable when it is produced, sold or imported, but it may also become payable in other circumstances, such as when a good is exported, leased, transferred, delivered, or used for own consumption or own capital formation. |
| Terms of trade | Terms of trade represent the relationship between export and import prices. Australia's terms of trade are calculated by dividing the implicit price deflator for exports by the implicit price deflator for imports. |
| Term to maturity | In these statistics, debt securities are classified into short term (equal to or less than one year) or long term (greater than one year) according to their original term to maturity (sometimes called tenor) rather than the time remaining until maturity. The original term to maturity is the time period from the issue of a security until the principal becomes due for repayment. |
| Total factor income | Total factor income is that part of the cost of producing the gross domestic product which consists of gross payments to factors of production (labour and capital). It represents the value added by these factors in the process of production, and is equivalent to gross domestic product less taxes plus subsidies on production and imports. |
| Total requirements coefficients | A total requirement coefficient at the intersection of a row *i* and column *j* of a table represents the value of output of industry *i* required directly and indirectly to produce 100 units of output absorbed by final demand (i.e. final output) of industry *j*. |
| Tourism | Tourism comprises the activities of visitors. |
| Tourism characteristic industries | Are those industries that would either cease to exist in their present form, producing their present products, or would be significantly affected if tourism were to cease. Under the international TSA standards, core lists of tourism characteristic industries, based on the significance of their link to tourism in the worldwide context, are recommended for implementation to facilitate international comparison. In the Australian TSA, for an industry to be a country-specific tourism characteristic industry, at least 25 per cent of its output must be consumed by visitors. |
| Tourism characteristic products | Are those products that would either cease to exist in meaningful quantity, or for which sales would be significantly reduced, in the absence of tourism. Under the international TSA standards, core lists of tourism characteristic products, based on the significance of their link to tourism in the worldwide context, are recommended for implementation to facilitate international comparison. In the Australian TSA, for a product to be a country-specific tourism characteristic product, at least 25 per cent of the output of the product must be consumed by visitors. |
| Tourism connected industries | Are those, other than tourism characteristic industries, for which a tourism related product is directly identifiable (primary) to, and where the products are consumed by visitors in volumes which are significant for the visitor and/or the producer. All other industries are classified as non-tourism industries, though some of their products may be consumed by visitors and are included in the calculation of direct tourism GVA or direct tourism GDP. |
| Tourism connected products | Are those that are consumed by visitors but are not considered as tourism characteristic products. All other products in the supply and use table not consumed by visitors are classified as 'all other goods and services' in the ATSA. |
| Tourism consumption | Tourism consumption consists of tourism expenditure plus imputed consumption by resident and non-resident visitors on tourism related products, including those sold at prices that are not economically significant. |

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| Tourism expenditure | Tourism expenditure consists of the amount paid by a visitor or on behalf of a visitor for and during his/her trip and stay at the destination. |
| Tourism industry ratio | This sis the proportion of the total value added of an industry which is related to tourism. |
| Tourism product ratio | This is the proportion of the total supply of a product which is consumed by visitors. |
| Tourism trip | A tourism trip is defined by the international TSA standards as those trips which are taken by visitors. |
| Trade credits and advances | Trade credit is credit for the purchase of goods and services extended directly to corporations, to government, to NPIs, to households and to the rest of the world. It also includes advances for work that is in progress (if classified as such under inventories) or is to be undertaken. |
| Trade margin | Trade margin is defined as the difference between the actual or imputed price realised on a good purchased for resale and the price that would have to be paid by the distributor to replace the good at the time it is sold or otherwise disposed of. |
| Transaction | A transaction is an economic flow that is an interaction between institutional units by mutual agreement or an action within an institutional unit that it is analytically useful to treat like a transaction. |
| Transferable deposits | Transferable deposits comprise all deposits that are exchangeable for banknotes and coins on demand at par and without penalty or restriction, and directly usable for making payments by cheque, draft, direct debit/credit or other direct payment facility. |
| Transport margin | Transport margins include any transport charges invoiced separately. The costs arising through the transport of goods from a producer to a purchaser by a third party even without a separate invoice is excluded from the basic price of the good being transported and is recorded as a transport margin. The latter treatment is adopted for the I-O tables only and is a deviation from the treatment outlined in the 2008 SNA and applied in the ABS S-U tables. |
| Type of activity unit (TAU) | The TAU is a producing unit comprising one or more business entities, sub-entities or branches of a business entity that can report production and employment activities via a minimum set of data items. The activity of the unit should be as homogeneous as possible. |
| Underground production | Underground production is defined as activities which may be legal but are deliberately concealed from public authorities to avoid:<br>• the payment of income, value added or other taxes;<br>• the payment of social security contributions;<br>• having to meet certain legal standards such as minimum wages, maximum hours, safety or health standards, etc.; and/or<br>• complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms. |
| Unincorporated enterprise | An unincorporated enterprise represents the production activity of government units, NPISHs or households that cannot be treated as the production activity of a quasi-corporation. |
| Unit labour costs | These series represent a link between productivity and the cost of labour in producing output. A nominal Unit Labour Cost (ULC) measures the average cost of labour per unit of output while a real ULC adjusts a nominal ULC for general inflation. A ULC is calculated as the ratio of labour costs per hours worked by employees divided by volume gross value added per total hours worked. Positive growth in a real ULC indicates that labour cost pressures exist. |
| Unlisted shares | Unlisted shares are equity securities not listed on an exchange. Unlisted shares can also be called private equity. Venture capital usually takes this form. |
| Usual environment | The usual environment is made up of one or more areas in which a person undertakes their regular activities such as their residence, place of work, place of study and other places frequently visited. The usual environment criteria has two dimensions. Frequency means places that are visited on a routine basis (at least once a week) are considered |

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| | part of a person's usual environment, even if the place visited is located a considerable distance from place of residence. Distance means locations close (up to 40 kilometres from home for overnight trips and up to 50 kilometres from home (round trip) for day trips) to the place of residence of person are also included in their usual environment. |
| Valuables | Valuables are held as a store of value and include precious metals and stones not held for use as inputs to production, antiques, works of art and other valuables such as collections of jewellery of significant value. Valuables are not within the boundary of produced assets in the ASNA currently. |
| Vineyards, orchards and other plantations of trees yielding repeat products | Vineyards, orchards and other plantations of trees yielding repeat products comprise trees (including vines and shrubs) cultivated for products that they yield year after year, including those cultivated for fruits and nuts, for sap and resin, and for bark and leaf products. |
| Visitor | A visitor is defined as any person 'taking a trip to a main destination outside his/her usual environment, for less than a year, for any main purpose (business, leisure or other personal purpose) other than to be employed by a resident entity in the country or place visited'. |
| Wages and salaries | Wages and salaries payable in cash include the value of any social contributions, income taxes, etc., payable by the employee even if they are actually withheld by the employer for administrative convenience or other reasons, and paid directly to social insurance schemes, tax authorities, etc., on behalf of the employee. Wages and salaries may be paid as remuneration in kind instead of, or in addition to, remuneration in cash. Separation, termination and redundancy payments are also included in wages and salaries. |
| Weapons systems | Weapons systems consist of delivery systems such as warships, submarines, fighter aircraft, bombers and tanks. They are classified as produced non-financial fixed assets. |
| Withdrawals from income of quasi-corporations | Withdrawals from income of quasi-corporations occur when the owner of a quasi-corporation chooses to withdraw some or all of the entrepreneurial income of the quasi-corporation. |

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