Australian System of National Accounts

Concepts, Sources and Methods

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PREFACE

This publication is a guide to the Australian 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.

The Australian system of national accounts is based on the international standard, *System of National Accounts, 1993* (SNA93). The previous printed version of *Australian National Accounts: Concepts, Sources and Methods* (Cat. no. 5216.0) was published in 1990. At that time the accounts were based on the 1968 version of the SNA. 5216.0 has been extensively revised to reflect the implementation of SNA93 in the Australian national accounts, the introduction of chain volume measures to replace constant price estimates and the integration of the national income, expenditure and product accounts with the input-output tables. These changes were first introduced in the September quarter 1998 issue of *Australian National Accounts: National Income, Expenditure and Product* (Cat. no. 5206.0). The publication has also been extended to include material covering national and sector balance sheets and productivity measures.

The information contained in this publication is consistent with statistics published in *Australian System of National Accounts, 1999–2000* (Cat. no. 5204.0) and *Australian National Accounts: National Income, Expenditure and Product, June quarter 2000* (Cat. no. 5206.0). Over time, changes in the data sources and methods used to compile the accounts occur and, less frequently, conceptual changes are also made. Such changes are documented in the publication in which they first appear.

Although balance of payments and public finance statistics are an integral part of the Australian system of 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 Position, Australia: Concepts, Sources and Methods* (Cat. no. 5331.0). An updated manual (Cat. no. 5514.0) covering public finance statistics is expected to be available in 2001.

An electronic version of 5216.0 is available on the ABS website, www.abs.gov.au (starting at the home page select: Statistics—Statistical Concepts Library—ABS concepts, sources, methods and statistical frameworks—5216.0).

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CHAPTER 1 NATURE, PURPOSE AND HISTORY OF NATIONAL ACCOUNTS

NATURE AND PURPOSE OF NATIONAL ACCOUNTS

1.1 National accounts provide a systematic statistical framework for summarising and analysing economic events, and wealth of an economy and its components. Historically, the principal economic events recorded in 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 by 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.

1.2 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-output 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 and volume measures, the national accounts can be presented in real as well as current values, and time series of national accounts information can be adjusted to remove seasonal distortions and to disclose trends.

1.3 National accounting information can serve many different purposes. In general terms, the main purpose of 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.

NATURE AND PURPOSE OF NATIONAL ACCOUNTS
continued

1.4 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.

1.5 The system of national accounts also provides a conceptual framework for other statistical systems. 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

1.6 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.

1.7 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. But 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 input-output statistics.

1.8 Adam Smith, in his *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 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.

BRIEF HISTORY OF NATIONAL ACCOUNTS
continued

1.9 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.

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

1.11 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 input-output 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.

1.12 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* (SNA)[3], which described the first version of the system that has become the accepted world-wide standard for producing national accounts.

2 Office of European Economic Co-operation, *National Accounts Studies*, Paris, 1951-53; and Office of European Economic Co-operation, A Standardised 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.

BRIEF HISTORY OF NATIONAL ACCOUNTS
continued

1.13 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.).

1.14 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); input-output 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 an SNA framework[5].

1.15 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 and the World Bank. The resulting *System of National Accounts 1993* (referred to as SNA93) was released under the auspices of those five organisations[6].

1.16 SNA93 aims to clarify and simplify the 1968 System, while updating the System to reflect new circumstances. SNA93 fully integrates national income, expenditure and product accounts, input-output 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. SNA93 also introduces the concept of satellite accounts to extend the analytical capacity of national accounts in areas such as tourism, health and the environment.

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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.

BRIEF HISTORY OF NATIONAL ACCOUNTS
continued

1.17 SNA93 is one of a planned quartet of 'harmonised' international statistical standards that also include the standards set out in the IMF publications *Balance of Payments Manual 1993 (fifth edition)* (BPM5), *Manual of Monetary and Financial Statistics* (MMFS) (soon to be released), and A Manual of Government Finance Statistics (second edition) (GFS) (still under development). 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 each system serves different purposes, complete alignment of the standards is neither feasible nor necessary. Each system therefore has a proportion of unique concepts and definitions. Because 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 ASNA and Australia's balance of payments, government finance, and monetary and finance statistics. The relationships between the ASNA and the other statistics are discussed in Chapter 2.

NATIONAL ACCOUNTS IN AUSTRALIA

1.18 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.

1.19 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*.

1.20 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 input-output estimates were published in 1964[10].

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.

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 input-output statistics[12] in the same year.

1.21 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 by the first official estimates in 1987[16]. They are now published annually in *Australian National Accounts: State Accounts* (Cat. no. 5220.0). A subset of major State statistics is published in *Australian National Accounts: Quartery State Details* (Cat. no. 5206.0.40.001). 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 have now been incorporated into the quarterly *Australian National Accounts: National Income, Expenditure and Product* (Cat. no. 5206.0).

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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.

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.

1.22 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.

1.23 SNA93 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.

Preliminary data on an SNA93 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).

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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.

NATIONAL ACCOUNTS IN AUSTRALIA *continued*

- 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).

The first annual national accounts publication on an SNA93 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.

1.24 The standards set out in SNA93 are designed to be applied with a degree of flexibility, and Australia's implementation of the standards reflects local conditions and requirements. Furthermore, decisions have been made in isolated instances to depart from the standards because of strong user preference for an alternative view. Such departures are noted at appropriate points in 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.

PURPOSE OF THIS MANUAL

1.25 The main purpose of this manual is provide users of the ASNA 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, the manual provides an updated account of the concepts, sources and methods used to compile the Australian national accounts statistics. The concepts underlying the ASNA, based on SNA93, are discussed in Chapters 3 to 10 of the manual. These chapters provide an overview of the conceptual framework, and a detailed discussion concerning each of the main elements of the framework, including institutional units and sectors, statistical units and industries, accounting rules, the accounting framework, supply and use tables, and price and volume measures. Chapters 11 to 28 outline the sources of information from which the national accounts statistics are compiled and the methods employed to derive the final statistics from the source data. A discussion of issues relating to the quality of Australia's national accounts is provided in Chapter 29. A number of Appendices are also included to provide additional information on particular aspects of the national accounting, such as the classifications underlying the accounts, differences between the ASNA and SNA93, seasonally adjusted and trend estimates, and the introduction of the goods and services tax.

PURPOSE OF THIS MANUAL
continued

1.26 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 International Monetary Fund (IMF), the Organisation for Economic Co-operation and Development (OECD), the World Bank and the United Nations Statistics Division—generally these agencies require a reasonably detailed understanding of all aspects of the statistics, and 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, 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.

1.27 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. These users should read Chapters 3 to 10, but may avoid the more detailed material. Some years ago the ABS published *A Guide to Australian National Accounts* (Cat. no. 5235.0), aimed at the more general user. That document is still relevant and helpful, but needs to be updated because there have been changes to some of the key concepts, classifications and presentations of the statistics. The ABS plans to update that publication at a later date.

1.28 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. Also, given the constantly changing economic environment and the need for frequent evaluation of and changes at the margin to data sources and methods, this publication would quickly become out of date. Rather, this publication aims to provide a substantial guide to what the ABS does to compile national accounts statistics. Even so, the publication will become out of date over time, and users should keep abreast of changes to data sources and methods which are announced from time to time in the quarterly and annual national accounts publications (Cat. nos 5206.0 and 5204.0). It is intended to update the present publication periodically.

CHAPTER 2 THE AUSTRALIAN NATIONAL ACCOUNTS

SCOPE OF THE AUSTRALIAN SYSTEM OF NATIONAL ACCOUNTS (ASNA)

2.1 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, input-output tables, balance sheet statistics (including capital stock statistics), multifactor productivity statistics, and State accounts. The ultimate scope of the ASNA encompasses the full range of statistics that SNA93 recommends for a complete national accounting system. However, like most other countries, Australia does not yet compile the full range of information recommended in SNA93. The areas where the ABS is yet to implement the SNA93 recommendations are identified at relevant points throughout this manual and are summarised in Appendix 2, Differences between ASNA and SNA93.

2.2 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* (Cat. no. 5209.0)—irregular;
- *Australian National Accounts: State Accounts* (Cat. no. 5220.0)—annual; and
- *Australian National Accounts: Financial Accounts* (Cat. no. 5232.0)—quarterly.

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 now included in Cat. no. 5204.0.

2.3 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, and a financial account. Important economic variables such as gross domestic product, disposable income, final consumption expenditure, gross saving and net lending or borrowing are recorded in these accounts (the accounts and variables are explained in Chapters 3 to 10). Supporting accounts in these publications provide further breakdowns (for example, by institutional sector and industry) of the variables recorded in the central accounts.

2.4 The information published in Cat. nos 5209.0 (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 supply and use table in Cat. no. 5209.0, 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 type of information published in Cat. no. 5204.0. Similarly, the information published in *Australian National Accounts: Quarterly State Details* (5206.0.40.001) provides a subset of the quarterly national accounts published in Cat. no. 5206.0.

2.5 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. The financial accounts include flow of funds statistics, which 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. Changes to the balance sheet values of financial assets and liabilities arising from events other than transactions (for example, write-offs and revaluations) are also recorded in the financial accounts.

2.6 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 commodities, 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, identified in Chapters 3 and 4, that fall outside the defined boundaries of production, consumption, accumulation and economic assets. Nevertheless, as explained in Chapter 4, 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

2.7 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. Chapters 11 to 28 provide 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. The next few paragraphs provide a broad description of the processes and infrastructure that underlie compilation of the Australian national accounts.

2.8 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. 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.

2.9 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 the national accounting standards described in Chapters 5 and 6. 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.

2.10 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 items. 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'.

2.11 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, SNA93 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. National accounts compilers therefore 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 SNA93 requirements.

2.12 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. Time series analysis is described in more detail in Appendix 3. Chain volume estimation involves removing the effects of price changes from source data, which are recorded at current prices. Price and volume estimation is discussed in more detail in Chapter 10.

2.13 Once all adjustments and derivations have been made, compilers should have a complete data set 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.

GENERAL NATURE OF ASNA METHODOLOGY *continued*

2.14 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 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.

2.15 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

2.16 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 commodities. 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 real movements in the economic indicators.

2.17 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 and gross operating surplus of corporations, the expenditure items of final consumption expenditure (government and households) and gross fixed capital formation, 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.

USES OF AUSTRALIAN NATIONAL ACCOUNTS STATISTICS *continued*

2.18 As well as Australia's national accounts, the ABS produces annual accounts for each of Australia's States and Territories each year (in Cat. no. 5220.0). These provide estimates of gross state product (GSP) and state final demand. A subset of these annual statistics is published quarterly in Cat. no. 5206.0.40.001. An important use of State accounts is to compare each State and Territory in terms of levels of economic activity and rates of economic growth.

2.19 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 to which accumulation of household debt counteracts potential increases in household saving. 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 superannuation funds, non-residents) used by borrowers.

2.20 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 data set 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. 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 debt to equity, non-financial to financial assets, and debt to income. National and sector balance sheets provide additional information on the relationship between consumption and saving behaviour which can be used in analysing movements in the level of saving in Australia. Individuals can use the balance sheets to guide investment decisions. For example, the balance sheets show the value (and changes in the value) of land and houses, shares, cash and deposits, and livestock. This information can be

USES OF AUSTRALIAN NATIONAL ACCOUNTS STATISTICS *continued*

used to analyse the return on assets over the last decade or so. 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.

2.21 The ASNA's input-output tables (published in Cat. no. 5209.0) provide a much more detailed disaggregation of the gross domestic product account than is available in the national income, expenditure and product accounts. Input-output 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 input-output 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.

USES OF AUSTRALIAN NATIONAL ACCOUNTS STATISTICS *continued*

2.22 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, and 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 register and the surveys.

CHAPTER 3 OVERVIEW OF THE CONCEPTUAL FRAMEWORK

INTRODUCTION

3.1 The conceptual framework of the ASNA is based on the standards set out in SNA93. At this stage of its development, the ASNA does not include all of the elements of the SNA93 framework, although Australia's implementation of SNA93 is extensive relative to the implementation of most other countries. Also, although the concepts and definitions used in the ASNA generally conform with the standards set out in SNA93, some minor variations have been adopted to allow for particular Australian data supply conditions or user requirements. Such variations are noted at appropriate points in this publication.

3.2 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, input-output statistics are produced that record the supply and use of different types of goods and services, or commodities, by the various industries. Many of the statistics in the ASNA are compiled in volume (real) as well as current price (nominal) terms by application of SNA93 recommendations for price and volume measures. Each of the foregoing major elements of the ASNA is described in the following broad overview of the ASNA conceptual framework.

ECONOMIC CONCEPTS AND THE NATIONAL ACCOUNTS

3.3 **Production** is the process whereby inputs of labour, materials, accumulated capital assets and knowledge are applied to provide outputs of goods and services. As recommended in the SNA93, the ASNA measure of production does not include the value of unpaid domestic services produced and consumed within households (sometimes called 'unpaid household work'), although the ABS has published separate estimates of unpaid work (which comprises unpaid household work and volunteer and community work) in information and occasional papers relating to the periods 1986–87, 1992 and 1997 (Cat. nos. 5236.0 and 5240.0). The ABS is also exploring the possibility of developing household satellite accounts to provide more information about productive activity within the household. Although the SNA93 recommends coverage of all forms of illegal production, for practical reasons such production is generally not covered in the ASNA. Production includes provision of goods and services free of charge or at nominal prices by governments and non-profit institutions. Production in the ASNA also includes imputed values for services provided by owner-occupied dwellings, backyard production of food and other goods by households for their own consumption, services provided by financial institutions for which no explicit charges are made, and services provided by owner-builders in the construction and alteration of dwellings.

3.4 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 (both of which are defined below). GDP less consumption of fixed capital (depreciation) is called *net domestic product*. 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 gross fixed capital formation), changes in inventories and exports less imports of goods and services.

3.5 *Output* consists of the value of goods and services produced within a producing unit and available for use outside the unit. Output includes work-in-progress and finished goods produced during the accounting period that have not been sold and are therefore held in inventories. *Market output* is output that is intended for disposal at economically significant prices. These are prices which have a significant influence on the amounts producers are willing to supply and purchasers wish to buy. Accordingly, market output is valued using market prices, which are generally transaction prices. *Non-market output* includes output produced for the producer's own final consumption, own-account capital formation and output that is intended for disposal at prices that are not economically significant, such as the output of government units and most non-profit institutions. Non-market output is valued according to costs incurred or by reference to market prices for analogous goods or services.

3.6 *Intermediate consumption* consists of the value of goods and services consumed in the production process, other than depreciation of fixed assets. (*Depreciation is recorded separately as consumption of fixed capital*.) Intermediate consumption includes the value of goods transformed in the production process, goods and services consumed entirely in the process, and consumption of ancillary services (e.g. accounting, marketing, transportation, storage) within the institutional unit undertaking the production.

3.7 There are several measures of **income** in the ASNA. *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. *Gross national income* equals total factor incomes, plus taxes less subsidies on production and imports, plus net primary income receivable from non-residents. Gross national income less consumption of fixed capital is called net national income. *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 equal to the balance on the sums of primary and secondary incomes payable and receivable.

3.8 *Compensation of employees* includes wages and salaries (paid in cash and in kind) and employer social contributions, on behalf of employees, to 'social insurance schemes' to provide benefits, such as retirement benefits, to the employees. Wages and salaries in kind can include meals, housing, uniforms, vehicles available for personal use, transportation, child care, etc.

3.9 The primary income of corporations is *gross operating surplus*, which is the excess of gross output over the sum of intermediate consumption, compensation of employees, and taxes less subsidies on production and imports. Gross operating surplus is also calculated for general government, where it equals consumption of fixed capital, and for dwellings owned by persons. Gross mixed income is the surplus on production of unincorporated enterprises. It includes a return to the owners' labour and capital inputs hence—the term 'mixed income'.

3.10 **Final consumption expenditure** is expenditure on goods and services that are used for direct satisfaction of individual or collective needs and wants. It excludes expenditure on valuables and non-produced non-financial assets and is recorded only for the households sector (which, in the ASNA, includes non-profit institutions serving households) and the general government sector. *Household final consumption expenditure* includes goods and services purchased by households (including non-profit institutions serving households) as well as the value of goods produced by households for their own consumption and the imputed value of the services of owner-occupied dwellings (but not expenditures on the purchase of dwellings). Household final consumption expenditure also includes the acquisition by households of consumer durables (e.g. motor vehicles, televisions, washing machines) even though such goods provide a stream of services to their owners over their lifetimes. *Government final consumption expenditure* covers all government expenditure on goods and services provided to individuals and the community. It is equal to the value of government non-market output less the value of any sales of that output.

3.11 **Saving** represents that part of disposable income that is not spent on consumption. It can be measured, for the economy as a whole or for individual sectors and subsectors, on a 'gross' basis (gross disposable income less final consumption expenditure) or on a 'net' basis (gross saving less consumption of fixed capital).

3.12 **Accumulation** represents net additions to net worth that occur in the accounting period. It comprises the acquisition and disposal of assets and liabilities and changes in the value of assets and liabilities arising from *revaluations* and *other changes in the volume of assets* such as write-offs, catastrophic losses, mineral discoveries and growth of natural resources. In the ASNA, acquisitions and disposals of non-financial assets are recorded in the *capital account*. Acquisitions and disposals of financial assets and liabilities are recorded in the *financial account*. Revaluations and 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.

ECONOMIC CONCEPTS AND THE NATIONAL ACCOUNTS
continued

3.13 The acquisitions and disposals of non-financial assets shown in the capital account are broken down into gross fixed capital formation, net acquisitions of non-produced non-financial assets and changes in inventories. *Gross fixed capital formation* is the net result of the acquisition and disposal of fixed assets. (The 'gross' in gross fixed capital formation reflects the fact that the estimates are not adjusted for consumption of fixed capital.) *Non-produced non-financial assets* include land, subsoil assets and other natural assets. Conceptually, net acquisitions of valuables should also be recorded in the capital account, but as there is no reliable data source in Australia for such transactions this item is not included in the ASNA.

3.14 The net acquisition of non-financial assets is financed by gross saving (or net saving plus consumption of fixed capital) and capital transfers. The balance of the capital account is known as **net lending/borrowing**. If gross saving plus capital transfers exceeds the net acquisition of non-financial assets then there is a surplus that results in the accumulation of financial assets or a reduction in liabilities. On the other hand, a deficit on the capital account has to be financed by increased liabilities or by a reduction in financial assets.

3.15 The *balance sheets* record the economic concept of **wealth**. Balance sheets record the accumulated values of assets and liabilities at a particular point in time, valued using the prices as at that point in time. **Net worth** is equal to the value of assets less the value of liabilities.

3.16 The economic concepts underlying the national accounts are described in more detail in Chapter 4.

INSTITUTIONAL UNITS AND SECTORS

3.17 In SNA93, 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 SNA93 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 SNA93 and the ASNA: households, non-profit institutions, government units and corporations (including quasi corporations).

INSTITUTIONAL UNITS AND SECTORS *continued*

3.18 Institutional units are grouped into institutional sectors according to their characteristics and institutional role. All households are allocated to the *households 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 sector*. In the ASNA the non-profit institutions serving households sector is included in the households sector.

3.19 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 economic interest in Australia's economic territory.

3.20 The concepts of institutional units and sectors are explained in more detail in Chapter 5.

PRODUCING UNITS AND INDUSTRIES

3.21 For the purpose of providing statistics about production classified by industry, SNA93 specifies the use of narrower units than the institutional units described above, which are often too heterogeneous in terms of their productive activity to provide useful information about industries. The producing unit recommended in SNA93 is the kind-of-activity unit, which is a part of an institutional unit that engages in one productive activity. However, SNA93 also suggests that an alternative unit can be used, namely the establishment, which covers all productive activity at a single location.

3.22 In the ASNA, the most commonly used producing unit is the *management unit*, which is the largest unit within a business for which relevant accounts are kept, having regard for industry homogeneity. However, some statistics are compiled using the *establishment* unit. This unit differs from the SNA93 establishment unit as it consists of one or more of an enterprise's locations that engage in the same predominant production activity within an Australian State or Territory. There is a hierarchical relationship between establishments and management units: a management unit consists of one or more establishments within the parent enterprise.

3.23 In the ASNA, each establishment and management unit is classified to an industry that is defined in the *Australian and New Zealand Standard Industrial Classification 1993* (ANZSIC), which is based on the principles and classification structure set out in the United Nations' *International Standard Industrial Classification of All Economic Activities* (ISIC). ISIC is the industry classification that the SNA93 recommends for use in national accounts.

3.24 Producing units and industries are discussed in more detail in Chapter 6.

FLOWS, STOCKS AND ACCOUNTING RULES

3.25 The national accounts record economic flows and stocks. Economic stocks are assets (both financial and non-financial) and liabilities. Economic flows reflect the creation, 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 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. They include revaluations of assets and liabilities, and changes in the volume of assets arising from events such as mineral discoveries, catastrophic losses, depletion, write-offs, and growth of natural assets.

3.26 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, except where returns are delayed (e.g. as for some timber plantation assets and artistic originals).

3.27 SNA93 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, which are described in the relevant chapters, 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.

FLOWS, STOCKS AND ACCOUNTING RULES
continued

3.28 In the national accounts, data are recorded in *aggregates* (which are the sums of the values of stocks and flows of a given type—e.g. total output) and *balancing items* (which are the differences between aggregates on each side of an account or between other balancing items—e.g. 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 households sectors, and to transactions in used fixed assets within sectors. Transactions between establishments of the same enterprise are generally not consolidated. However, transactions in financial instruments and related income flows are fully consolidated.

3.29 Chapter 7 has more information on flows, stocks and accounting rules.

SYSTEM OF ACCOUNTS

3.30 The main accounts in the ASNA are as follows:

- gross domestic product (GDP) account, which records the value of production (GDP), the income from production and the final expenditures on goods and services produced;
- income accounts, which show primary and secondary income transactions, final consumption expenditures and consumption of fixed capital. Net saving is the balancing item for these accounts;
- capital accounts, which 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. Net lending/borrowing is the balancing item for these accounts;
- financial accounts, which show the net acquisition of financial assets and the net incurrence of liabilities. The balance on these accounts is the net change in financial position, which is conceptually equivalent to the net lending/borrowing balance in the capital account; and
- balance sheets, which record the stock of assets, both financial and non-financial, and liabilities at a particular point in time. Net worth is the balance from the balance sheets.

The ASNA's accounts are based on the system of accounts outlined in SNA93. However, the ASNA's GDP and income accounts reflect the combination of the SNA93's production account and various income accounts. More details on the system of accounts are provided in Chapter 8.

INPUT-OUTPUT FRAMEWORK

3.31 Input-output tables are essentially a disaggregation of the gross domestic product account. In the gross domestic product account only transactions representing final production are shown and intermediate production is netted out. Input-output tables on the other hand bring back into focus inter-industry flows of goods and services, thereby providing a more complete description of the process of economic production. They provide detailed information about the supply and disposition of commodities in the economy and the structure and interrelationships of industries. The conceptual basis for input-output tables is described in Chapter 9.

VOLUME AND PRICE MEASURES

3.32 As well as being presented in current price terms - where current prices are those that are actually associated with particular transactions - expenditure and production aggregates are also presented in *chain volume terms*. The reason for this is to provide time series of estimates which are free of the direct effects of price change. Chain volume measures show how the quantities underlying the current price estimates change from one period to another.

3.33 The basic principle behind volume estimates is that unit prices are held constant from one period to the next. If, however, unit prices are held constant for too long then the quality of volume estimates deteriorates to the extent that relative prices change. To overcome this problem, the ABS compiles its volume measures using the 'chain' approach. Under this approach, the prices used to derive the volume estimates are updated frequently (i.e. annually). Longer term movement estimates are derived by linking together the annual movement estimates. In order to provide estimates with dollar values, the derived volume movement estimates are referenced to a particular year's current price estimates. More details on how the ABS compiles its chain volume measures can be found in Chapter 10.

3.34 Two types of price indexes are published for the expenditure aggregates in the national accounts. The first type—which is called an *implicit price deflator* (IPD)—is derived simply by dividing a chain volume estimate into the corresponding current price estimate. However, due to the nature of their construction, short-term (i.e. quarterly) movements in the IPDs are affected by compositional changes as well as price changes.

3.35 The other type of price index published in the national accounts is a *chain price index*. These indexes are analogous to the chain volume estimates, except that in their derivation it is the volumes that are held constant and not the prices.

3.36 Chapter 10 provides more information on IPDs and chain price indexes.

CHAPTER 4 ECONOMIC CONCEPTS AND THE NATIONAL ACCOUNTS

INTRODUCTION

4.1 The national accounts record the essential elements of a market economy: production, income, consumption (intermediate and final), accumulation of assets and liabilities, and wealth. Under headings for each of these basic elements, this chapter explains how the elements are embodied in the national accounts and describes the more important national accounting concepts, aggregates and balancing items that reflect the economic elements.

PRODUCTION

4.2 As explained in Chapter 3, 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); 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).

4.3 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 houses, 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

4.4 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 SNA93 (and the ASNA), the value of domestic services produced and consumed within households, such as cleaning, washing, preparing meals, and child and aged care, is excluded from production because such services are relatively isolated and independent from markets, and are difficult to value in an economically meaningful way. 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.

4.5 With the exception of own-account household services, SNA93 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 SNA93 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.

4.6 Paragraph 6.15 of SNA93 states that, to satisfy the definition of production in an economic sense:

> "There must be an institutional unit that assumes responsibility for the (production) process and owns any goods produced as outputs or is entitled to be paid, or otherwise compensated for, the services provided."

Institutional units, which are explained fully in Chapter 5, are the basic units for which flows and stocks are recorded in the national accounts. The SNA93 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.

4.7 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 SNA93 (and the ASNA) such services are conventionally treated as consumed as soon as the assets are bought by a household. Paragraph 6.28 of SNA93 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."

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.

4.8 Units of the general government sector (as defined in Chapter 5) 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 (also defined in Chapter 5), 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.

4.9 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 transaction 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; and
- services provided by owner-builders in the construction of dwellings and major alterations and additions to dwellings.

Details of the above imputations are provided later in this chapter and in Chapters 14 and 15.

Gross domestic product (GDP)

4.10 GDP is the national accounting measure of production occurring in a whole economy during an accounting period (for example, 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* is equal to a producer's value of outputs from the production process less the value of commodity inputs (intermediate consumption) plus taxes on products payable less subsidies receivable. GDP is equal to the sum of the gross value added of all resident producers. GDP less consumption of fixed capital is called *net domestic product*.

4.11 GDP can be derived from income and expenditure flows as well as from direct measures of production. GDP is the source of income for the factors of production (labour and capital). Total factor income can therefore be derived by summing factor incomes (i.e. compensation of employees, gross operating surplus, gross mixed income). Adding taxes less subsidies on production to total factor income gives GDP at purchasers' (or market) prices. GDP can also be derived as the sum of all final expenditures on goods and services (that is, final consumption expenditures and gross fixed capital formation), 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. The various income and expenditure flows that can be used to derive GDP are discussed later in the relevant sections of this chapter.

4.12 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.

Output

4.13 Output consists of the value of goods and services produced within an establishment. (Establishments, which are producing units belonging to institutional units, are discussed in Chapter 6). Output includes production that is completed in the accounting period and production in the accounting period that remains incomplete at the end of the 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 establishment belonging to the same enterprise as intermediate inputs into the latter's production (enterprises, which are institutional units, are discussed in Chapter 5);
- retained by the producers for own final consumption or gross fixed capital formation;
- 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.

4.14 The output of an establishment 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. Two categories of output are recognised for national accounting purposes: market output and non-market output, which includes output produced for own final use and other non-market output.

Market output

4.15 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, or used for payments in kind. Market output also includes the value of changes in inventories of finished goods and work-in-progress intended for disposal on the market.

4.16 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, and are excluded from the value of output in the national accounts, 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), details of which are explained in Chapter 17.

Non-market output

Output for own final use

4.17 Output for own final use includes output for own final consumption and output for own gross fixed capital formation. The former consists of goods and services that are produced for final use by the owners of the enterprises in which they are produced. As discussed later, 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 (including those operated by households). Two examples of such output are agricultural goods produced and consumed by members of the same household, and rent of owner-occupied dwellings (see paragraph 4.76 for further discussion of these items).

Output used for own gross fixed capital formation

4.18 Goods or services used for own gross fixed capital formation can be produced by any kind of unit, whether corporate 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. As discussed, 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.

Other non-market output

4.19 Other non-market output consists of goods and services produced by non-profit organisations 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, non-profit institutions often do not fully charge for their services because such institutions are formed to provide services to members or the needy. As noted in paragraph 4.8, the non-market output of general government units and non-profit institutions 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) and consumption of fixed capital. These units therefore do not generate a net operating surplus (defined in paragraphs 4.53 and 4.54) from their non-market production.

Output of particular industries

4.20 The general rules governing the recording and valuation of output require elaboration in application to the output of certain industries, mostly service industries such as transport and storage, wholesale trade and retail trade. The methods used to estimate the output of such industries are described in Chapter 24. However, measurement of the output of the finance and insurance industries is a special case and is discussed below.

Financial intermediaries (except insurance and pension funds)

4.21 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.

4.22 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. In the system, 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. Accordingly, in the national accounts, interest flows are adjusted to take account of the service charges that form part of the output of financial intermediaries. As these charges cannot be measured directly, they must be estimated indirectly. The imputed charges are accordingly referred to as financial intermediation services indirectly measured (FISIM).

4.23 In the ASNA, FISIM is estimated as the difference between the interest rates on loans and deposits and a 'pure', or reference rate, of interest. 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. For a detailed explanation of the estimation of FISIM see Chapters 14 and 20.

Insurance and pension funds

4.24 Insurance is a form of financial intermediation in which funds are paid by policyholders 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. The value of such services, which form 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.

Output of particular industries continued

4.25 The value of output of the services produced by insurance enterprises is estimated as the difference between (i) revenue from premiums and interest on investments and (ii) expenses in the form of expected claims and changes in allocations to technical reserves required to build up the capital sums guaranteed under policies. The methods for estimating output of insurance enterprises are explained fully in Chapters 14 and 20.

Intermediate consumption

4.26 Intermediate consumption (or intermediate input) 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.

4.27 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. (Ancillary services are explained more fully in Chapter 6).

4.28 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. 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 (see Chapter 16). However, rentals paid on fixed assets that are leased from other institutional units under operating leases (see next paragraph) are included as part of intermediate consumption, along with fees, commissions, royalties, etc., payable under licensing arrangements.

Distinction between operating leases and financial leases

4.29 *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. 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 therefore 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

4.30 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

4.31 This boundary is not always clear cut. For example, 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.

4.32 There are also difficult choices to be made in relation to repairs and maintenance. SNA93 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. These and other issues relating to the boundary between intermediate consumption and gross fixed capital formation are discussed in Chapter 15.

Research and development

4.33 SNA93 recognises that, because the purpose of research and development is to improve efficiency or productivity or to produce other future benefits, it is inherently more of an investment than a consumption activity. However, because of the difficulty of identifying and valuing the assets produced by research and development activities, such activities, along with staff training, market research and similar activities, are to be treated as intermediate consumption.

Defence equipment

4.34 SNA93 distinguishes between expenditure on defence equipment that is used in the same way in both military and civil applications, and on equipment that is never used or does not have, and cannot have, civilian applications. The former class of defence equipment includes buildings, roads, bridges, airfields and docks; vehicles, ships or aircraft used for the transport of people; and computers and office machinery. Acquisition of all such goods is classified as gross fixed capital formation.

4.35 On the other hand, weapons or their delivery systems are not and cannot be used for civilian purposes. SNA93 recommends that acquisition of such goods should be classified as intermediate consumption and therefore also as government final consumption expenditure. Thus, acquisitions of rockets, and of missiles and their warheads, is treated as consumption, rather than as capital formation. Furthermore, goods that are designed to deliver weapons, such as warships, submarines, fighter aircraft, bombers and tanks, are also classified as consumption expenditure.

Consumption of fixed capital

4.36 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 volume of assets' as part of accumulation, which is discussed in paragraphs 4.82, 4.98 and 4.115.

4.37 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 therefore 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. The concepts and methods are discussed in detail in Chapter 16.

Valuation of industry output and value added

4.38 SNA93 recommends use of basic prices for the valuation of industry outputs, and purchasers' prices for valuation of intermediate inputs and of final demand (discussed in paragraph 4.73).

Basic prices

4.39 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), and 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. The basic price therefore measures the amount retained by the producer in respect of the good or service that is produced as output.

4.40 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.

Purchasers' prices

4.41 The purchaser's price is the amount paid by the purchaser in order to take delivery of good 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 Goods and Services Tax (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.

4.42 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'.

INCOME

4.43 The economic concept of income is generally understood as the maximum amount a household or other unit can consume without reducing its wealth. However, wealth can be changed by events (such as holding gains and losses, natural catastrophes, etc.) that do not constitute income as measured in the national accounts. In the national accounts, income is broken down into several components. These include primary incomes such as factor incomes, property income and taxes on production and imports, and secondary incomes such as social benefits, social contributions, taxes on income and wealth, and other current transfers. The composition of incomes varies considerably between sectors, because the income receivable by one sector is payable by other sectors (e.g. taxes are income receivable by the general government sector and are payable by the other sectors).

4.44 In SNA93, for individual units and sectors, the net primary income receivable (i.e. primary income receivable less primary income payable) is called the balance of primary incomes. The total of the balance of primary incomes of all domestic sectors is called gross national income. Net national income is equal to gross national income less consumption of fixed capital. Some primary incomes, such as property income and compensation of employees, can be received from and paid to non-residents. Gross national income can therefore be derived as the total balance of all (resident and non-resident) primary incomes less the balance of primary incomes receivable from non-residents.

4.45 For individual units and sectors, disposable income is the net result of all primary and secondary incomes. The total of disposable income for all domestic sectors is called gross disposable income. Some components of secondary incomes, such as taxes on income and wealth and other current transfers, can be received from, or paid to, non-residents. Gross disposable income can therefore be derived as the total balance of all (resident and non-resident) income flows less the net result of flows to non-residents. Disposable income less social transfers in kind gives adjusted disposable income. Social transfers in kind are explained in the discussion of the major elements of income in paragraph 4.71.

Factor incomes

4.46 Gross value added at purchasers' 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—see paragraph 4.53 for an explanation of operating surplus and mixed income).

4.47 The sum of factor incomes plus taxes less subsidies on production and imports gives GDP at market prices.

Compensation of employees

4.48 SNA93 (paragraph 7.21) 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."

Compensation of employees comprises wages and salaries (in cash and in kind) and employers' social contributions.

Compensation of employees continued

4.49 *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—see discussion in paragraphs 4.51 and 4.52), 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).

4.50 *Wages and salaries paid in kind* can 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 and low interest loans. Some of these benefits may appear more like intermediate consumption, but are included in compensation of employees because they are benefits that employees often have to provide themselves and are designed to attract employees.

4.51 *Employer social contributions* are amounts paid by employers (or imputed as payments by employers) to provide social benefits for employees. The social benefits can include retirement benefits (e.g. superannuation), sickness benefits, dependants' benefits in the event of the employee's death, and severance benefits. Employer social contributions are usually paid directly by the employer into investment funds (called 'social insurance schemes' in SNA93) 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 employer social contributions to be imputed as the amount that would have had to be invested to pay for future benefit payments (the methods used to impute contributions to unfunded schemes are described in Chapter 22).

4.52 Although employer contributions to funded social insurance schemes are usually paid by employers to the scheme operators, in the national accounts all employer 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 social contributions add to GDP.

Operating surplus and mixed income

4.53 Operating surplus is the income from production of corporate enterprises, while mixed income is the term used to denote the income from production of unincorporated enterprises. 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). Descriptions of the methods used to estimate operating surplus and mixed income in the ASNA are contained in Chapter 20.

4.54 Operating surplus and mixed income can be measured on a gross or net basis. Gross operating surplus and gross mixed income are equal to gross value added at basic prices less compensation of employees and taxes less subsidies on production and imports other than net taxes on products (or gross value added at factor cost less compensation of employees). 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.

Taxes less subsidies payable on production and imports

4.55 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. Taxes on production and imports include: (i) taxes that are payable on goods and services when they are produced, delivered, sold, transferred or otherwise disposed of by their producers; (ii) taxes and duties on imports payable when goods enter the economic territory or when services are delivered to residents by non-residents; and (iii) other taxes on production such as taxes on ownership or use of land, buildings, or other assets used in production, or on the labour employed, or on labour costs. For individual units and sectors, taxes in category (i) 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.

4.56 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. 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. Subsidies are not payable to households; current government transfers to households are treated as social benefits and as part of secondary income.

Property incomes

4.57 Property incomes are received by the owners of financial assets and tangible non-produced assets such as land and subsoil assets (the various types of assets are discussed in paragraphs 4.84 to 4.97). 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 system. 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. As discussed in paragraph 4.29, under operating leases rentals are treated as output of the lessor and purchase of a service by the lessee. The various items of property income are discussed in the following paragraphs.

Interest

4.58 Interest is receivable by the owners of financial assets such as deposits, loans and accounts receivable, and securities other than shares. Interest is defined in paragraph 7.93 of SNA93 as:

> "Under the terms agreed between them, 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.

4.59 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. Methods used to attribute interest to accounting periods are discussed in Chapter 22.

4.60 As discussed in paragraph 4.29, 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.

4.61 Interest is recorded after allowing for FISIM, the interest component that represents charges for financial intermediation services rendered, as discussed in paragraphs 4.22 and 4.23. As customers of financial intermediaries, institutional units may deposit money with the intermediaries, in which case FISIM is added to the actual interest receivable by the customer and interest payable by the financial intermediary. FISIM is also shown as intermediate or final consumption of the customer and as output of the intermediary. Institutional units also borrow from intermediaries, in which case FISIM is deducted from interest payable by the customer and from interest receivable by the financial intermediary, and also shown as intermediate or final consumption of the customer and output of the intermediary.

Dividends

4.62 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.

Withdrawals from income of quasi corporations

4.63 Quasi corporations are unincorporated enterprises that behave as if they were corporations. They are discussed in detail in Chapter 5. Because they are not corporations, quasi corporations cannot distribute profits by way of dividends. 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.

4.64 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 on foreign direct investment

4.65 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. The rationale underlying the SNA93 treatment is that the direct investment enterprise is, by definition, subject to control or influence by the foreign investor(s), and the decision to retain earnings is a conscious investment decision by the foreign investor.

Secondary income

4.66 Secondary income consists entirely of current transfers. Transfers are transactions in which one institutional unit provides a good, service or asset to another unit without receiving from the latter any good, service or asset in return. A capital transfer is one in which the ownership of an asset (other than cash) is transferred or which obliges one or both parties to acquire or dispose of an asset. All transfers not meeting these criteria are current transfers. The main types of secondary income are discussed in the following paragraphs.

Current taxes on income and wealth

4.67 These taxes are part of the gross secondary income of the general government sector and are deducted in the derivation of the net secondary income of other sectors. Most of the taxes consist of taxes on income of households or profits of corporations and taxes on wealth that are payable regularly (wealth taxes paid irregularly are capital taxes).

Social contributions and benefits

4.68 Social benefits are current transfers received 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: social insurance benefits and social assistance benefits. 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.

4.69 As discussed in relation to employer social contributions (see paragraphs 4.51 and 4.52), social contributions paid by employers on behalf of employees, including imputed contributions to unfunded schemes, are treated as part of the employees' primary income and as being paid to social insurance funds by the employees. Employer social contributions, along with social contributions paid directly by employees, are therefore deducted from gross secondary income of households to arrive at net secondary income of households.

Other current transfers

4.70 Other current transfers include non-life insurance premiums (after deduction of the service charge) and claims, current transfers within general government (e.g. grants from one level of government to another), current transfers between the government and governments of other countries or international organisations (e.g. UN, OECD), transfers (e.g. membership fees, subscriptions, donations) to non-profit institutions, current transfers between households, fines and penalties, and compensation paid (other than as an insurance claim) for injury, property damage or death.

Social transfers in kind

4.71 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 a pharmaceutical benefits scheme). Social transfers in kind are not regarded as part of the disposable income of households, but are included in *adjusted disposable income and actual consumption* (see next section).

FINAL CONSUMPTION AND SAVING

4.72 Consumption can involve either the use of goods and services in the process of production (intermediate consumption), as discussed in the section on production, or final consumption. Final consumption can be measured as expenditure on final consumption or as actual final consumption (explained below). Disposable income (see previous section) is either expended on final consumption or saved. Saving is available, along with net capital transfers, to finance elements of capital accumulation, which is discussed in the next section.

4.73 As noted in paragraph 4.11, 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. Gross fixed capital formation is discussed in the next section, relating to accumulation and wealth.

Final consumption expenditure

4.74 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. Final consumption expenditure is undertaken only by the households sector, the non-profit institutions serving households sector (NPISH) (which, in the ASNA, is combined with the households sector—see Chapter 5) and the general government sector. However, any expenditure undertaken for business purposes by unincorporated enterprises (which are part of the households sector) is treated as intermediate consumption expenditure of the unincorporated enterprise, and not part of household final consumption expenditure.

Household Final consumption expenditure

4.75 In the ASNA, household final consumption expenditure includes expenditure by resident households on goods and services, whether the expenditure is made within the domestic territory or by Australian residents abroad (see Chapter 5 for the definition of residents), and expenditure by non-profit institutions serving households. Specific transactions in household final consumption expenditure include:

- the value of income received in kind by employees (as discussed in paragraph 4.50) 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—see paragraphs 4.22 and 4.23 (however, FISIM attributed to unincorporated enterprises owned by households is classified as intermediate consumption of the unincorporated business);

Household Final consumption expenditure continued

- the service charge component of premiums paid for insurance and pension fund services—see paragraphs 4.24 and 4.25; 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.

4.76 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. Purchases of dwellings therefore constitute gross fixed capital formation. 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.

Government final consumption expenditure

4.77 Most government final consumption expenditure is current expenditure on goods and services provided to the community. Such goods and services are either provided free or at prices that cover only a small proportion of the costs of producing the goods and services. As discussed in paragraphs 4.8 and 4.19, because most of the goods and services provided have no directly observable value, a direct measure of government non-market output is not available. The value of government non-market output is therefore considered to be identical to the cost of producing the output, which is equivalent to measuring government non-market output as the cost of all current expenditures made by government in the course of providing non-market goods and services to the community. The relevant expenditures are compensation of employees, the cost of other goods and services used (intermediate consumption), and the consumption of fixed capital. Government final consumption expenditure is then valued as the value of non-market output less the value of any sales of non-market goods and services.

Actual final consumption

4.78 The concept of actual final consumption is aimed at recording consumption in the sector where it actually occurs rather than in the sector where consumption expenditure is made. Therefore, government final consumption expenditure on services that benefit individual households (called individual services) is included with household actual final consumption, leaving government actual final consumption equal to government final consumption expenditure on services that benefit the community as a whole (called collective services).

Actual final consumption *continued*

4.79 Household actual consumption therefore includes government final consumption expenditures on education, health, social security and welfare, sport and recreation and culture, which are considered to be individual services. Excluded are expenditures on the provision of security and defence, the maintenance of law and order, the maintenance of public health and protection of the environment, which are considered to be collective services. Government actual final consumption is therefore equal to government final consumption expenditures on collective services. In SNA93, all services provided by non-profit institutions serving households are treated as individual services and are included in household actual final consumption. Because such non-profit institutions are included in the households sector in the ASNA, their final consumption expenditures are automatically included in household actual final consumption.

Saving

4.80 Saving represents that part of disposable income that is not spent on final consumption of goods and services. For individual units and sectors, and for the economy as a whole, gross saving is equal to gross disposable income less final consumption expenditure. Saving can also be derived as adjusted disposable income less actual final consumption. Net saving is equal to gross saving less consumption of fixed capital.

4.81 Saving can be either positive or negative. If it is negative, the excess of outlays over income must be financed either by disposing of existing assets or by incurring liabilities. When saving is positive it must be used to acquire financial or non-financial assets of one kind or another. Such transactions are part of accumulation and are discussed in the next section.

ACCUMULATION AND WEALTH

4.82 The value of assets less the value of liabilities is known in the system as net worth and is the system's measure of wealth. Accumulation represents the net additions to net worth that occur in the accounting period and includes acquisition and disposal of assets and liabilities by institutional units, and changes to the values of assets and liabilities arising from other events which, in the system, are known as *revaluations and other changes in the volume of assets*. Because the system's categories of stocks (i.e. assets and liabilities) are also used to categorise accumulation flows, wealth (assets and liabilities) is discussed before accumulation.

Wealth (assets and liabilities)

4.83 Assets are defined generally in SNA93 (paragraph 13.12) as entities

> "(a) over which ownership rights are enforced by institutional units, individually or collectively; and
>
> (b) from which economic benefits may be derived by their owners by holding them, or using them, over a period of time."

Wealth (assets and liabilities) *continued*

4.84 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.

4.85 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). The categories of assets that are covered by the balance sheets in the system are discussed in the following paragraphs. Liabilities are categorised in the same way as financial assets.

Non-financial assets

4.86 Non-financial assets consist of fixed assets, which are produced as outputs of the production process, and non-produced assets, which come into existence through processes other than production.

Produced assets

4.87 *Tangible produced 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 included if they could be used for civilian purposes;
- 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 included if they could be used for civilian purposes;
- transport equipment, including motor vehicles, semi-trailers, ships, locomotives and aircraft. 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.;

Non-financial assets continued

- cultivated assets, 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—see Chapters 16 and 26; and
  - vineyards, orchards, and other plantations of trees yielding repeat products such as sap, resin, bark and leaf products. As explained in Chapters 16 and 26, the treatment of these assets in the ASNA does not comply fully with the SNA93 recommendations.

4.88 Transport machinery and equipment acquired by defence forces are included as assets if they could be used in a fashion similar to civilian assets and could conceivably be switched from military to civilian use. Weapons and weapon delivery systems, including warships, submarines, tanks and fighter aircraft, are not treated as assets, and purchases of such items are treated as part of government intermediate and final consumption expenditure rather than as capital formation.

4.89 *Intangible produced fixed assets* include the following:

- 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. Large expenditures on the purchase, development or extension of databases are also included; 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.

4.90 *Inventories* 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).

4.91 *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 fixed assets in the ASNA.

Non-financial assets continued

Non-produced assets

4.92 *Tangible 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. Tangible non-produced assets 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; and
- other natural assets such as native forests available for commercial exploitation and water resources which are subject to some form of ownership or use rights, market valuation or some measure of economic control. As discussed in Chapters 16 and 26, due to data limitations, water resources are not included in the ASNA.

4.93 *Intangible non-produced assets* 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 purchased goodwill. As discussed in Chapters 16 and 26, not all of these assets are covered in the ASNA, because of data deficiencies.

Financial assets and liabilities

4.94 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 (but see shares and other equity below). Liabilities are the counterparts of financial assets. With the exception of monetary gold and Special Drawing Rights (SDRs), the acquisition of a financial asset by an institutional unit involves a counterpart liability on the part of another institutional unit. Financial assets and liabilities are classified according to financial instruments as follows :

- monetary gold and SDRs. Monetary gold is gold owned by the monetary authorities (in Australia's case, the Reserve Bank of Australia) that is held as a financial asset and as a component of a country's foreign reserves. All other gold held is treated as a physical commodity and classified as either inventories or valuables. Special drawing rights (SDRs) are international reserve assets created by the International Monetary Fund (IMF) and allocated to the IMF's member countries to supplement existing foreign reserves. SDRs are held exclusively by the central bank;
- currency, transferable deposits and other deposits;
- short-term securities—securities other than shares with an original maturity normally of one year or less;

Financial assets and liabilities continued

- long-term securities—securities other than shares with an original maturity normally of more than one year;
- short-term loans—loans that have an original maturity normally of one year or less;
- long-term loans—loans that have an original maturity normally of more than one year (no distinction between long and short-term loans is made in the ASNA);
- derivatives, which are secondary securities linked to specific financial instruments, indicators or commodities;
- shares and other equity. Unlike other financial instruments, shares and other equity do not provide the right to a predetermined income. They are instruments or records acknowledging claims to the residual value of incorporated enterprises after the claims of all creditors have been met;
- insurance technical reserves, consisting of net equity of households on life insurance reserves and pension funds, and prepayment of premiums and reserves against outstanding claims. Insurance technical reserves are the assets of policyholders, and liabilities of insurance enterprises and pension funds;
    - net equity of households on life insurance reserves and on pension funds: these are reserves held by insurance enterprises and pension funds against outstanding risks, and reserves that add value on maturity to life insurance policies; and
    - prepayment of premiums and reserves against outstanding claims (for both life and non-life insurance): prepayment of premium reserves arises from the fact that, in general, insurance premiums are paid in advance. Reserves against outstanding claims are reserves of insurance enterprises and pension funds held to cover amounts expected to be paid out in respect of claims that are not yet settled or that may be disputed; and
    - trade credits and advances and other accounts receivable and payable

4.95 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. Data are also presented for financial assets and liabilities cross-classified by financial instrument and sector.

4.96 The system also includes memorandum items to show assets that are not separately identified in the central national accounting framework, but are of more specialised analytical interest. These are:

- consumer durables, which are not defined as assets in the system, but are of special interest. These cover private motor vehicles and other household durables; and

Financial assets and liabilities continued

- direct investment, which comprises financial assets and liabilities attributable to foreign direct investment, which are not recorded separately within financial instrument categories.

Net worth

4.97 As indicated in paragraph 4.82, net worth is equal to total assets less total liabilities and is the balancing item in the system's balance sheets. Whereas, in principle, the net worth of a corporation is equal to the difference in the value of the total assets owned by the company and its debt, in practice this value may not equal the value placed on the company by the market. Accordingly, in the system, the net worth of a corporation exists separately from the market value of shareholders' equity in the corporation, which is counted as a liability in the calculation of net worth. Net worth can be positive or negative and should reflect the market value of the wealth of the units, sector or economy being measured.

Accumulation

4.98 As mentioned in paragraph 4.82, accumulation represents net additions to net worth arising from acquisition and disposal of assets and liabilities by institutional units and changes to the values of assets and liabilities arising from revaluations and other changes in the volume of assets. The following discussion of accumulation is segmented according to the accounts in which the various types of accumulation are recorded. A complete discussion of the accounts appears in Chapter 8. In SNA93 (and the ASNA), the *capital account* records accumulation of non-financial assets and liabilities as well as sources of funds, such as capital transfers and saving, to finance that accumulation. The *financial account* records acquisition and disposal of financial assets and liabilities. In the ASNA, revaluations and other changes in the volume of assets are recorded in an account that reconciles the opening balance sheet, changes to assets and liabilities arising from transactions, revaluations and other changes in the volume of assets, and the closing balance sheet. The main entries in each of these accounts are discussed in the following paragraphs.

Capital account entries

4.99 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, changes in inventories, and acquisitions less disposals of non-produced non-financial assets. The balancing item in the account is *net lending* or *borrowing*. Each of these entries not discussed previously is discussed in the following paragraphs.

Capital account entries continued

Capital transfers

4.100 As noted in the discussion of current transfers, transfers are transactions in which one institutional unit provides a good, service or asset to another unit without receiving from the latter any good, service or asset in return. A capital transfer is one in which:

- ownership of an asset (other than cash or inventories) is transferred from one institutional unit to another (i.e. a capital transfer in kind); or
- cash is transferred to enable the recipient to acquire another asset; or
- the funds realised by the disposal of an asset are transferred.

The first category of capital transfers includes cancellation of liabilities by mutual agreement between creditor and debtor, sometimes known as 'debt forgiveness'. Unilateral cancellation of debt by a creditor does not constitute a transaction between institutional units; accordingly it is treated as writing off of the debt and is recorded with other changes in the volume of assets. 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). The second category of capital transfers also includes taxes that are deemed to be capital taxes. These are taxes, such as inheritance and gift taxes, that are non-recurrent and required to be paid only when a specific event (such as death of the taxpayer) occurs.

4.101 Gross saving plus capital transfers receivable less capital transfers payable (or net saving plus capital transfers receivable less capital transfers payable plus consumption of fixed capital) is called *gross saving and capital transfers* and is the amount of resources available to fund non-financial capital accumulation, which consists of gross fixed capital formation, acquisitions less disposals of valuables, changes in inventories, and acquisitions less disposals of non-produced non-financial assets.

Gross fixed capital formation

4.102 Gross fixed capital formation is equal to the total value of a producer's acquisitions, less disposals, of fixed assets (as defined in paragraphs 4.87 to 4.89) 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. 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.

Capital account entries continued

4.103 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 asset acquiring unit, 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.

4.104 Cases at the boundary between gross fixed capital formation and intermediate consumption are discussed in the earlier section of this chapter dealing with intermediate consumption.

Acquisitions less disposals of valuables

4.105 As discussed in paragraph 4.91, valuables are a separate category of non-financial assets that are not held for use as inputs to production. Acquisitions and disposals of valuables are also accounted for separately in the capital account. However, in the ASNA, a separate category has not been created because of lack of information about acquisitions and disposals of valuables.

Changes in inventories

4.106 Changes in inventories has already been discussed in the section dealing with production. However, the acquisition and disposal of inventories constitutes capital formation (or reduction) and changes in inventories is accordingly recorded in the capital account as well as part of production.

Acquisitions less disposals of non-produced non-financial assets

4.107 As discussed in paragraphs 4.92 and 4.93, non-produced non-financial assets include land, subsoil assets, other natural assets available for commercial exploitation, and intangible assets such as patents, broadcasting licences, other transferable contracts and purchased goodwill. All acquisitions and disposals of such assets are part of accumulation but, as discussed in Chapters 16 and 26, coverage of such transactions in the ASNA is limited because of data deficiencies.

Net lending or borrowing

4.108 Net lending/borrowing is the balancing item in the capital account. As stated in paragraph 4.101, the value of *gross saving and capital transfers* is the amount available for the acquisition of financial and non-financial assets. Gross saving and capital transfers, less the sum of gross fixed capital formation, changes in inventories and net acquisitions of non-produced non-financial assets, is defined in the capital account as *net lending* if positive, or *net borrowing*, if negative.

Capital account entries continued

4.109 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 and capital transactions in the balance of payments.

Financial account entries

4.110 The financial account in the ASNA records changes in financial assets and liabilities arising from financial transactions. Changes in financial assets are recorded under the heading *net acquisition of financial assets*, which refers to acquisitions less disposal of financial assets. Changes to liabilities 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 or subsectors of counterparties, as discussed in the previous section on financial assets and liabilities (see paragraphs 4.94 and 4.95).

4.111 As discussed in relation to capital account entries, the balance of the capital account (net lending/borrowing) is technically equal to the balancing item in the financial account, which is equal to net acquisition of financial assets less net incurrence of liabilities. 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. As discussed in Chapter 25, these differences are usually recorded in an item for net errors and omissions.

Entries in the reconciling account

4.112 As discussed in paragraph 4.99, in the ASNA, accumulation entries for revaluations and other changes in the volume of assets are recorded in an account that reconciles these entries with the opening balance sheet, transactions during the accounting period and the closing balance sheet. The account shows such information for each of the types of assets and liabilities discussed in paragraphs 4.87 to 4.96.

Revaluations

4.113 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 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. Such decomposition has not yet been introduced to the ASNA, which records only nominal holding gains and losses.

Entries in the reconciling account continued

4.114 Holding gains and losses refer to 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 also recorded with other changes in the volume of assets.

Other changes in the volume of assets

4.115 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 changes in the volume of assets are categorised in SNA93 as follows:

- *Economic appearance of non-produced assets*—includes discovery of subsoil assets, transfers of other natural assets to economic activity, quality changes to non-produced assets arising from changes in economic use, and appearance of intangible non-produced assets such as patents and goodwill.
- *Economic appearance of produced 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.
- *Natural growth of non-cultivated biological resources*—includes natural growth of virgin forests, fishstocks, etc.
- *Economic disappearance of non-produced 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, 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).

Entries in the reconciling account continued

- *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 superannuation 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.

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. These matters are discussed in detail in Chapter 25.

Change in net worth

4.116 Change in net worth can be derived as the value of net worth in the closing balance sheet less the value of net worth in the opening balance sheet. Change in net worth reflects the results of transactions, revaluations and other changes in the volume of assets. Change in net worth can be decomposed into change in net worth due to saving and net capital transfers, change in net worth due to other changes in the volume of assets, and change in net worth due to revaluations.

CHAPTER 5 INSTITUTIONAL UNITS AND SECTORS

INTRODUCTION

5.1 The analytical power of the national accounts depends not only on the recording of economic activity and wealth for the economy as a whole, but also requires segmentation of the economy into analytically useful categories. At an elemental level, economic activity and wealth can be attributed to institutional units, which are the basic transactor units in the system. To enhance the analytical usefulness of the accounts, SNA93 groups institutional units with similar functions in the economy into institutional sectors (and associated subsectors). The total economy consists of the entire set of institutional units that are resident in it. This chapter defines the concepts of residence, institutional units and institutional sectors, and describes the implementation of the concepts of units and sectors in the ASNA (the SNA93 concept of residence is adopted without modification in the ASNA). For the purpose of compiling production statistics classified by industry, the focus is on what SNA93 refers to as *producing units*. These are units, owned by institutional units, which are engaged in the production of goods and services. These units are discussed in Chapter 6.

RESIDENCE

5.2 The ASNA records the economic activity and wealth of resident institutional units. Resident institutional units are those institutional units that maintain a centre of economic interest in the domestic economic territory. The domestic economic territory of a country is defined, in paragraph 14.9 of SNA93, to comprise:

- the geographic territory administered by a government within which persons, goods, and capital circulate freely;
- any islands belonging to that country which are subject to the same fiscal and monetary authorities as the mainland;
- the airspace, territorial waters, and continental shelf lying in international waters over which the country 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 a country does not include the territorial enclaves used by foreign governments which are physically located within the geographical boundaries of that country.

5.3 An institutional unit is said to have a centre of economic interest in a country 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 on a significant scale, either indefinitely or for a finite but long period of time (generally defined as one year or more—but see paragraph 5.4). 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). 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 there[1].

5.4 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.

5.5 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, as do 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.

5.6 International organisations established by international agreement (such as the United Nations) are accorded sovereign status, with their own economic territory consisting of the land or 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.

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1 If the centre of 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. (See Chapter 4 for an explanation of a foreign direct investment enterprise.)

THE SNA93 CONCEPT OF INSTITUTIONAL UNITS

5.7 In any economy, economic activity is undertaken by a variety of transactors. For example, 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. Corporations are created for the purpose of producing goods or services for the market, usually as a source of profits for the units that own them. 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. Government units organise and finance the provision of non-market goods and services to individual households and the community at large, mainly out of taxation. They are also concerned with the distribution and redistribution of income and wealth in accordance with government policies. Households are primarily consumer units, although they may also engage in any kind of economic activity, including the operation of unincorporated enterprises.

5.8 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, SNA93 defines transactor units, called institutional units, and groups them into institutional sectors and subsectors.

Institutional units

5.9 An institutional unit is defined in paragraph 4.2 of SNA93 as:

> "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."

5.10 One major defining characteristic of an institutional unit is that either a complete set of accounts, including a balance sheet of assets and liabilities, exists for the unit, or it would be possible and meaningful, from both an economic and legal viewpoint, to compile a complete set of accounts if they were required.

5.11 SNA93 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

5.12 Households consist of persons or groups of persons. 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.

Households continued

5.13 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' (see next paragraph).

Legal or social entities

5.14 The second type of institutional unit is a legal or social entity that engages in economic activities and transactions in its own right. SNA93 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.

5.15 Corporations are defined in SNA93 as legal entities, 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. Corporations include incorporated enterprises, public limited liability companies, public corporations, private companies, joint stock companies, limited liability companies and so on. In the system, corporations cannot incur final expenditures for the benefit of households and, unlike NPIs, all of the profit of corporations ultimately benefits other institutional units (i.e. shareholders).

5.16 Government units are defined in SNA93 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 the provision out of taxation and other income; (ii) redistribute income and wealth by means of transfers; and (iii) engage in non-market production.

5.17 Non-profit institutions are defined in paragraph 4.54 of SNA93 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."

5.18 SNA93 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.

THE ASNA EQUIVALENT OF INSTITUTIONAL UNITS

5.19 The units concepts used in the ASNA are based on the units model used in the ABS business register. These units concepts are based on SNA93 concepts, but are a little more complex in order to better reflect business and organisational structures in Australia. The units model underlying the ASNA comprises the following units:

- legal entity;
- enterprise group;
- enterprise;
- management unit;
- establishment; and
- location.

5.20 A *legal entity* is an entity which possesses some or all of the rights and obligations of individual persons or corporations. Examples of legal entities for statistical purposes include companies, partnerships, trusts, sole proprietorships, government departments and statutory authorities. The legal entity unit closely approximates the SNA93 concept of legal and social entities described above, but includes unincorporated enterprises operated by households. In SNA93, such unincorporated enterprises are included with households.

5.21 The *enterprise group* consists of a unit covering all operations in Australia of one or more legal entities under common ownership and/or control. It covers all operations in Australia of legal entities that are related in terms of the current Corporations Law (as amended by the *Corporations Legislation Amendment Act 1991*). Therefore, an enterprise group may contain a mixture of enterprises (see below) classified to the non-financial corporations sector and the financial corporations sector depending on the functions performed by individual legal entities within the group.

5.22 The *enterprise* is a unit comprising all legal entities within an enterprise group that are classified to the same institutional subsector (for example, the life insurance corporations subsector within the financial corporations sector). Thus an enterprise group which contains legal entities that belong to more than one institutional subsector is split up into two or more mutually exclusive enterprises.

5.23 The remaining units in the model (management units, establishments, and locations) refer to producing units and are discussed in Chapter 6.

THE ASNA EQUIVALENT OF INSTITUTIONAL UNITS
continued

5.24 Most surveys providing information for the ASNA, other than detailed production information, use the ABS enterprise unit. However, most enterprises comprise only one legal entity and, as described in paragraph 5.22, those that comprise more than one legal entity are circumscribed by an institutional subsector boundary. For that reason, use of the enterprise unit for compiling statistics classified by institutional sector or subsector (as in the ASNA) is effectively the same as using a legal entity unit. As noted, the ABS legal entity unit is the same as the SNA93 institutional unit, with the exception that it includes household unincorporated enterprises. In the compilation of the Australian national accounts, household unincorporated enterprises are identified separately and included with households. Each of the different types of institutional units identified in SNA93 (i.e. corporations and quasi corporations, government units, NPIs and households) can be identified in the ASNA.

THE SNA93 CONCEPT OF INSTITUTIONAL SECTORS

5.25 SNA93 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 households sector; and
- the non-profit institutions serving households sector (NPISH).

Table 5.1 shows the SNA93 allocation of types of institutional units to institutional sectors. The same allocation rules are followed in the ASNA. However, as explained in paragraph 5.45 below, in the ASNA the NPISH sector is combined with the households sector.

5.1 ALLOCATION OF TYPES OF INSTITUTIONAL UNITS TO INSTITUTIONAL SECTORS

Institutional Units	Non-financial corporations sector	Financial corporations sector	General government sector	Households sector	Non-profit institutions serving households sector
Corporations (including quasi corporations)	Non-financial corporations (including quasi corporations)	Financial corporations (including quasi corporations)			
Government units			Government units		
Households				Households	
Non-profit institutions (NPIs)	Market NPIs serving non-financial corporations	Market NPIs serving financial corporations	Non-market NPIs controlled and financed by government units		Non-market NPIs serving households

Non-financial corporations sector

5.26 The non-financial corporations sector consists of corporations and quasi corporations that are principally engaged in the production of market goods and non-financial services. 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), and non-profit institutions that are market producers of goods or non-financial services.

5.27 SNA93 identifies three subsectors within the non-financial corporations subsector:

- *Public non-financial corporations* are resident non-financial corporations or quasi corporations that are government owned or controlled.
- *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.
- *Foreign controlled non-financial corporations* are resident non-financial corporations or quasi corporations that are controlled by non-resident institutional units.

Financial corporations sector

5.28 The financial corporations sector consists of resident corporations, 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.

5.29 To the extent that they qualify as quasi corporations, unincorporated financial enterprises are also classified to the financial corporations sector. As discussed previously, they must have a complete set of accounts that are separable from the accounts of their owners in their personal capacities.

Financial corporations sector *continued*

5.30 Subsectors of the financial corporations sector identified in SNA93 are:

- *Central bank*—the monetary authority (in Australia's case this is the Reserve Bank of Australia).
- *Other depository corporations*—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. Banks are included in this subsector.
- *Other financial intermediaries except insurance corporations and pension funds*—all resident corporations and quasi corporations primarily engaged in financial intermediation except depository corporations, insurance corporations and pension funds. The types of corporations included under this heading are investment corporations, hire purchase corporations and those engaged in the provision of personal finance or consumer credit.
- *Financial auxiliaries*—all resident corporations and quasi corporations primarily engaged in activities closely related to financial intermediation but which do not themselves perform an intermediation role (for examples see paragraph 5.28).
- *Insurance corporations and pension funds*—all resident insurance corporations and quasi corporations, and autonomous pension funds.

General government sector

5.31 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.

5.32 Subsectors within the general government sector are:

- central government;
- state government;
- local government; and
- social security funds (i.e. social insurance schemes covering the community that are imposed or controlled by government units—there are no such social security funds in Australia).

Households sector

5.33 The households 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 households 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.

5.34 The SNA suggests that the households 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 households sector, SNA93 advises that statistical agencies determine the number and nature of subsectors to suit their own purposes.

Non-profit institutions serving households sector (NPISH)

5.35 Table 5.1 shows that, with the exception of NPIs, all institutional units of a particular type are grouped together within the same sector. 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 *Non-profit institutions serving households sector* (NPISH). (As already noted, the NPISH sector has not been implemented in the ASNA.)

5.36 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:

- 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
- 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

5.37 In addition to accounts for the resident sectors, SNA93 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.

5.38 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 also international organisations that are not treated as resident institutional units.

INSTITUTIONAL SECTORS AND SUBSECTORS IN THE ASNA

5.39 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 *Standard Institutional Sector Classification of Australia* (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 SNA93 classification of institutional sectors. These distinctions are contained in other classifications within SESCA. Table 5.2 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 SNA93 definition of the rest of the world sector.

5.2 DOMESTIC SECTORS AND SUBSECTORS IN THE ASNA

SECTORS	SUBSECTORS
Non-financial corporations	Private
	Public
	Commonwealth
	State and local
Financial corporations	Reserve Bank of Australia
	Depository corporations
	Banks
	Other depository corporations
	Insurance corporations and pension funds
	Life insurance corporations
	Pension funds
	Other insurance corporations
	Other financial institutions
	Central Borrowing Authorities
	Financial intermediaries n.e.c.
	Financial auxiliaries
General government	National
	State and local
Households(a)	

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

INSTITUTIONAL SECTORS AND SUBSECTORS IN THE ASNA *continued*

5.40 With the exception of the combination of the NPISH and households sectors, the ASNA sectors correspond with those in SNA93. The subsectors are a combination of SNA93 subsectors (adapted to Australian conditions) and other SNA93-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 SNA93, SISCA and the ASNA distinguish Banks from other depository corporations, and Central Borrowing Authorities from other financial institutions.

5.41 The SNA93 institutional sector classification does not explicitly include a public sector/private sector dichotomy; however the ASNA provides such a dissection of the income and capital accounts for the non-financial corporations sector. Public non-financial corporations are government owned or controlled corporations and quasi corporations that are mainly engaged in production of goods and services for sale in the market with the intention of substantially covering their costs.

5.42 Central Borrowing Authorities (CBAs) are public sector financial corporations that are established in all the States and Territories except the Australian Capital Territory, primarily to provide finance for government authorities and to arrange investment of their surplus funds. Their main activities comprise the creation of financial assets and liabilities by issuing securities, and on-lending funds to public authorities in the same jurisdiction. However, they also engage in other financial intermediation activity (for investment purposes), and may participate in the financial management activities of governments.

5.43 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 SNA93 sector and subsector definitions

5.44 The composition of the ASNA institutional sectors and subsectors accords with SNA93 definitions in most cases. Instances where the ASNA's sectoral composition differs from the SNA93 guidelines are described in the following paragraphs.

Quasi corporations in the non-financial and financial corporations sectors

5.45 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, as noted in paragraph 5.14 above, SNA93 also recommends that all quasi corporations (that is, unincorporated enterprises which function like a corporation by maintaining a complete set of accounts, including balance sheets) be treated as corporations and allocated either to the non-financial corporations or the financial corporations sector. However, SNA93 also acknowledges that it is often difficult to distinguish quasi corporations owned by households. Such is the case in Australia, 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 other quasi corporations are included, by default, in the households sector in the ASNA.

Non-profit institutions serving households (NPISH)

5.46 In the ASNA, the recommendations of SNA93 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, 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 6 PRODUCING UNITS AND INDUSTRIES

INTRODUCTION

6.1 The previous chapter describes the *institutional units* operating in the economy, and the way in which institutional units with similar functions 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. This chapter describes the SNA93 guidelines for the delineation of producing units and the ABS application of the guidelines.

THE SNA93 CONCEPT OF PRODUCING UNITS AND INDUSTRIES

6.2 In SNA93, institutional units in their capacity as producers are described as enterprises (however the SNA93 enterprise unit should not be confused with the ASNA's enterprise unit described in Chapter 5). SNA93 notes that 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, SNA93 recommends partitioning of enterprises into units that are more homogeneous in terms of the range of productive activities in which they engage.

6.3 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 *International Standard Industrial Classification of All Economic Activities, Revision 3* (ISIC Rev. 3), 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.

6.4 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 of materials and equipment; personnel management; warehousing; transportation; sales promotion; cleaning, repairs and maintenance; security and surveillance.

6.5 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. If an 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

6.6 SNA93 discusses three types of units into which enterprises can be partitioned for the purpose of industry statistics. The kind-of-activity unit is 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 accounts for most of the value added. The local unit is an enterprise or part of an enterprise that engages in productive activity at, or from, one location. The establishment is a combination of the kind-of-activity and local units and is defined as a unit engaging significantly in one principal kind of activity at, or from, a single location (however, the SNA93 establishment unit should not be confused with the ASNA's establishment unit described below and in Chapter 5). Although establishments can engage in secondary activities, SNA93 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.

6.7 If an enterprise comprises 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.

6.8 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.

6.9 In SNA93, ancillary activities related to an individual establishment are treated as an integral part of the costs of the establishment's principal or secondary activities. An enterprise may include central ancillary units that carry out ancillary activities for all establishments of the same enterprise. SNA93 recommends that the costs of such ancillary activities be distributed across the establishments served by the ancillary unit.

Industries

6.10 An industry is defined in paragraph 5.40 of SNA93 as:

> "a group of establishments engaged in the same, or similar, kinds of activity".

As noted in paragraph 6.3 above, 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.

THE ASNA EQUIVALENT OF PRODUCING UNITS

6.11 The units model underlying the ASNA was partly described in Chapter 5, where the units in the model corresponding to SNA93 institutional unit were described. The producing units in the ASNA's units model are the management unit and the establishment. Locations from which producing units operate are also identified in the model.

6.12 The *management unit* is the highest-level accounting unit within a business, having regard for industry homogeneity, for which accounts are maintained; in nearly all cases it coincides with the legal entity owning the business (i.e. company, partnership, trust, sole operator, etc). In the case of large diversified businesses, however, there may be more than one management unit, each coinciding with a 'division' or 'line of business'. A division or line of business is recognised where separate and comprehensive accounts are compiled for it. Management units consist, in turn, of one or more establishments. The management unit is the statistical unit that is used in most ABS economic surveys that provide industry or production data.

6.13 The *establishment* is the smallest accounting unit of a business, within a State or Territory, controlling its productive activities and maintaining a specified range of detailed data including data enabling value added to be calculated. In general an establishment covers all operations at a physical location, but may consist of a group of locations provided they are within the same State or Territory. The majority of establishments operate at one location only. Establishments may coincide with individual management units, although in many businesses more than one establishment may be present within a management unit. Ancillary units are not specifically recognised in the ABS statistical units model. Units which engage in ancillary activities, and for which accounting data are available, are treated as establishments in their own right; otherwise they are subsumed in the data for the establishments that they serve.

6.14 The *location* is a site, occupied by an establishment, at or from which the establishment engages in productive activity on a relatively permanent basis. An establishment may operate from one or more locations.

INDUSTRIES IN THE ASNA

6.15 Establishments are classified to industries according to the *Australian and New Zealand Standard Industrial Classification (ANZSIC), 1993* (Cat. no. 1292.0). The ANZSIC 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, the ANZSIC is aligned as closely as possible with the ISIC.

6.16 The ANZSIC comprises four levels, namely Divisions (the broadest level), Subdivisions, Groups and Classes (the lowest level). Establishments are defined to be homogeneous at the class level, whereas management units are defined to be homogeneous at the subdivision level.

6.17 Industry statistics in the ASNA are presented on a basis that is consistent with the ANZSIC. Value added is presented on an ANZSIC industry basis at the Division level, and also at the Subdivision level for the Agriculture, forestry and fishing, Mining, Manufacturing, Electricity, gas and water supply and Transport and storage industries. A number of income components of the ASNA are also presented on an ANZSIC industry basis. Industry data in the input-output tables are classified according to the *Input-Output Industry Classification* (IOIC), which is based on the ANZSIC. While some of the input-output industries correspond to a single ANZSIC industry class, most IOIC industries constitute a grouping of similar ANZSIC industries. These groupings are formed to enable the input-output tables to present a balanced picture of the structure of the economy while maintaining comparability between the latest published tables and earlier ones. More information on the ANZSIC and the IOIC is contained in Appendix I.

6.18 In the ASNA, statistics classified by industry are sometimes referred to broadly in terms of 'industry sector'. That term refers to a high level of aggregation of industries, usually at the Division (e.g. Manufacturing) or Subdivision (e.g. Machinery and equipment manufacturing) level of the ANZSIC.

CHAPTER 7 FLOWS, STOCKS AND ACCOUNTING RULES

INTRODUCTION

7.1 A 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 at a given point in time. This chapter defines the nature of flows and stocks and outlines the rules of accounting that underlie the valuation and recording of flows and stocks. Unless indicated, the definitions and rules described are recommended in SNA93 and are applied without variation in the ASNA.

FLOWS AND STOCKS

7.2 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

7.3 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 appear in all accounts where flows appear (the current accounts and accumulation accounts noted in paragraph 7.2), except the revaluation account and the other changes in volume of assets account. *Other flows* appear in the latter two accounts.

Transactions

7.4 A transaction is defined in SNA93 (paragraph 3.12) 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."

The latter types of actions are internal transactions, which are described in paragraphs 7.17 to 7.19 below. 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

7.5 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, acquisition of a security, wages and salaries, interest, dividends, rent, taxes, and social assistance benefits in cash.

7.6 Expenditures on consumption of goods and services, capital formation, acquisition of a security, payment or receipt of wages and salaries, and payment or receipt of interest, dividends and rent, 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, 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.)

7.7 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 benefits.

7.8 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 to 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

7.9 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 rerouted.

7.10 Rerouting of three types of transactions occurs in the national accounts: employers' social contributions, retained earnings of foreign direct investment enterprises and certain property income flows of insurance corporations.

- *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 social insurance 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.
- *Retained earnings of foreign direct investment enterprises*—the retention of some or all of the earnings of a foreign direct investment enterprise within that enterprise can be regarded as a deliberate investment decision by the foreign owners. Accordingly, the retained earnings are rerouted in the national accounts by showing them as first remitted to the foreign owners as property income and then reinvested in the equity of the direct investment enterprise (see Chapter 4 (the section 'Property incomes') for an explanation of foreign direct investment enterprises).
- *Property income of insurance funds*—in the national accounts, the property income earned on the reserves of certain insurance funds is deemed to be earned on assets owned by policyholders. The property income is therefore recorded as being paid out to policyholders and then paid back again as premium supplements even though the property income is retained by the insurance enterprises.

Partitioned transactions

7.11 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.

7.12 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. (See Chapter 4 (the section 'Output of particular industries') for a more detailed explanation of these charges.)

Monetary transactions continued

7.13 A further example of partitioning is the recording of transactions for wholesalers and retailers. Wholesalers and retailers are viewed in SNA93 as selling the service of storing and displaying goods rather than the sale of the goods themselves. 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 the sales.

Recognising the principal party to a transaction

7.14 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

7.15 Transactions that do not involve the exchange of cash, or assets or liabilities 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

7.16 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 the other party in return for a good, service or financial asset with a clear market value.
- *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 land rent).
- *Transfers in kind*, which occur when one party provides a good, service or asset to the other without receiving a counterpart in return. Parallel to the transfers in cash discussed in paragraphs 7.6 and 7.7, 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 or social security in forms such as the provision of education, health, housing and other services provided to households by government or non-profit institutions.

Non-monetary transactions continued

Internal transactions

7.17 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, final uses and costs.

7.18 Consumption of fixed capital is an important example of an intra-unit transaction which is recorded in the national accounts. 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.

7.19 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

7.20 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, SNA93 recommends against recording the values of externalities in the national accounts.

7.21 SNA93 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.

7.22 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

7.23 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.

Other changes in the volume of assets

7.24 Other changes in the volume of assets may be divided into three main categories:

- 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; or the creation of intangible non-produced assets such as patents, broadcast licences and taxi plates;
- 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
- 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 is recorded as part of other flows in this category.

Holding gains and losses

7.25 Holding gains and losses 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. Holding gains and losses are recorded in the revaluation account.

7.26 Holding gains and losses measured on the basis of current prices are called nominal holding gains and losses. SNA93 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. This decomposition is currently not carried out in the compilation of the Australian national accounts.

STOCKS

7.27 Stocks are holdings of assets and liabilities at a point in time. Stocks are 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 level 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 the financial assets and liabilities are obtained directly from survey data.

7.28 Values are recorded for non-financial assets, both produced and non-produced, and for financial assets and liabilities (see Chapter 4 for descriptions of the various kinds of assets). 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.

ACCOUNTING RULES

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

Valuation

General rules

7.30 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.

7.31 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.

7.32 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 (see Chapter 4).

7.33 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.

7.34 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.

7.35 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, SNA93 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).

7.36 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 midpoint between the buying and selling rate, so as to exclude any implicit foreign exchange service charge.

7.37 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 the national accounting concept of the consumption of fixed capital.

7.38 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 revalued 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 for all but large and clearly identified examples of transfer pricing.

7.39 To maximise concordance with SNA93 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

7.40 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, SNA93 recommends that outputs of products be valued at basic prices, while inputs, or final purchases, should be valued at purchasers' prices.

7.41 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), and 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.

7.42 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.

7.43 The purchaser's price is the amount paid by the purchaser in order to take delivery of good 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 apply, 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.

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

7.45 The ASNA follows the SNA93 recommendations with respect to the valuation of products: in the input-output 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).

Time of recording

7.46 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

7.47 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, and 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.

7.48 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. The methods used to measure transactions in the financial accounts are described in Chapter 25.

Services

7.49 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. The methods used to value such services are described in Chapters 14 and 20.

Distributive transactions

7.50 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

7.51 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 good or service enters 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. In general, the collection methods used to support the ASNA result in estimates based on the accrual process, 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 proportioning to accounting periods depends on the rate of depreciation used to estimate the using up of the asset. The methods used to estimate consumption of fixed capital in the ASNA are described in Chapter 16.

Aggregation, netting and consolidation

Aggregation

7.52 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, resources need to be distinguished from uses and assets from liabilities.

Netting

7.53 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 for 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

7.54 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 input output tables, non-consolidation is the general rule.

CHAPTER 8 THE ACCOUNTING FRAMEWORK

INTRODUCTION

8.1 The system of national accounts is described in SNA93 (paragraph 1.1) as a:

> "coherent, consistent, and integrated set of macroeconomic accounts, balance sheets and tables based on internationally agreed concepts, definitions, classifications and accounting rules".

8.2 The accounts are designed to be implemented at different levels of aggregation, from the level of individual institutional units, through groupings of institutional units into institutional sectors and subsectors, to the level of the national economy as a whole. The system is built around a sequence of interconnected flow accounts, each of which records a particular form of economic activity. The flow accounts follow a sequence of economic processes, from production, through generation of income, to the use of income in the form of final consumption or capital accumulation. Economic wealth generated by the processes is recorded in the system's balance sheets.

8.3 An important feature of the flow accounts is that they are a double entry system and, therefore, are fully balanced. Every entry has a counterpart entry i.e. every outgoing reappears elsewhere as an incoming, reflecting the circularity of the economic process. Materials and the services of factors of production flow into productive enterprises, and final goods and services flow into consumption, capital formation and changes in inventories. These flows of goods and services are matched by reverse flows of money. Producers pay for their materials, and also pay out factor income which (after borrowing and lending transactions and transfers such as income taxes, and borrowing and lending transactions) flows back as payments from final purchasers.

8.4 Although SNA93 employs a clearly defined sequence of accounts, the authors point out (SNA93 paragraph 1.4) that the activities recorded in the accounts should not be interpreted as necessarily taking place sequentially. For example, incomes are generated continuously by production processes, while expenditures on the outputs produced may be taking place more or less simultaneously. An economy is a general equilibrium system, with simultaneous occurrences of interdependent economic activities involving countless transactions between different institutional units. Feedbacks are continually taking place from one type of economic activity to another.

8.5 The ASNA is based on similar principles to those described in SNA93. However, the presentation of accounts in the ASNA is modified somewhat to reflect the present state of development of national accounting in Australia and to provide national accounts estimates in a way that is considered most meaningful for Australian users.

INTRODUCTION *continued*

8.6 In this chapter, a broad outline of the ASNA accounting framework is given, followed by a description of each of the accounts that make up the ASNA. The definitions of items presented in the accounts in this chapter are provided in Chapter 4 and are not repeated here. Following this is a description of the relationships among key aggregates. The chapter concludes with a short discussion of the differences between the presentations of accounts in the ASNA and SNA93.

THE ASNA ACCOUNTING FRAMEWORK

8.7 The types of accounts in the ASNA reflect the major economic processes occurring in the economy, namely production, the distribution of incomes, consumption, saving and investment, financial flows and asset accumulation. The ASNA is composed of the following types of accounts:

- production accounts;
- income accounts;
- capital accounts;
- financial accounts; and
- balance sheets, supported by changes in balance sheet accounts.

8.8 Each of these accounts is produced for the economy as a whole, and the set of accounts together constitutes 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 type of sectoring used in the income and capital accounts since the classification of production units by industry in such a presentation is done without regard to institutional sector.

8.9 Another group of accounts that is an integral part of the national accounts is the external accounts. These accounts record 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 accounts are simply another set of sectoral accounts. However, because of the important role of the external sector, these accounts are a major focus of attention from economic analysts and international organisations in their own right.

Production accounts

8.10 Production accounts record the expenses incurred in production and the receipts from sales of goods and services during a particular period. Sales of goods and services (including goods and services produced for own use) are recorded on the credit side of the account. On the debit 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. The gross domestic product account is, in effect, a consolidation of the trading accounts of all producer units.

8.11 As shown in table 8.1, the receipts side of the gross domestic product account in the ASNA shows sales of goods and services to final users (including exports less imports) and changes in inventories. Because only sales to final users 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.

8.1 GDP ACCOUNT

EXPENDITURES	**INCOME**
Final consumption expenditure	Compensation of employees
Gross fixed capital formation	Gross operating surplus
Domestic final demand	Gross mixed income
Changes in inventories	*Total factor income*
Gross national expenditure	Taxes less subsidies on production and imports
Exports of goods and services	Statistical discrepancy (I)
less Imports of goods and services	
Statistical discrepancy (E)	
Gross domestic product	**Gross domestic product**

Statistical discrepancies in the production accounts

8.12 There are three approaches which can be used to measure GDP:

- the **income approach (I)**, which involves summing net factor incomes, consumption of fixed capital (depreciation) and taxes less subsidies on production and imports;
- the **expenditure approach (E)**, which involves summing all final expenditures, changes in inventories and exports less imports of goods and services; and
- the **production approach (P)**, which involves taking the value of goods and services produced by an industry (i.e. output) and deducting the cost of goods and services used up by the industry in the production process (i.e. intermediate consumption) and adding the result across all domestic industries. To this is added taxes less subsidies on products if output is valued at basic prices, as recommended in SNA93.

Statistical discrepancies in the production accounts continued

8.13 While each measure should, conceptually, deliver the same estimate of GDP, if the three measures are compiled independently using different data sources then different estimates of GDP result. However, the Australian national accounts estimates have been integrated with annual balanced supply and use tables. These tables have been compiled from 1994–95 up to the year preceding the latest completed financial year. As integration with balanced supply and use tables ensures that the same estimate of GDP is obtained from the three approaches, annual estimates using the I, E and P approaches are identical for the years for which these tables are available.

8.14 Prior to 1994–95, the estimates using each approach are based on independent sources, and there are usually differences between the 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. In chain volume terms, GDP is derived using the expenditure and production approaches. See also "The compilation of chain volume estimates of GDP" in Chapter 10.

8.15 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, in either current price or chain volume terms; and
- for years prior to 1994–95, for the latest year, and for all quarters, statistical discrepancies exist between estimates based on the 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.

Income accounts

8.16 The *national income account* (table 8.2) records sources and use of income. 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. The use of income (or disbursements) side of the 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. 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.

8.2 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**

8.17 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 subsectors, the balancing item in the subsector accounts is equal to net saving plus consumption of fixed capital (i.e. gross saving).

8.18 For corporations (both financial and non-financial), the income accounts show income arising from gross operating surplus from the gross domestic product account and property income (such as interest, dividends, reinvested earnings on direct foreign investment 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 rent on natural assets) to other sectors. The balance is the saving of the respective sectors and is transferred to their capital accounts.

8.19 The income account of the households 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 gross domestic product account, as well as property income (interest, dividends, property income attributed to insurance policyholders and rent on natural assets) from other sectors, social assistance benefits and various other forms of secondary income. 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 to non-residents and other sectors, consumption of fixed capital (on account of unincorporated enterprises and dwellings owned by persons) and net saving (the balancing item).

8.20 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. 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, consumption of fixed capital and net saving (the balancing item).

Adjusted disposable income accounts

8.21 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 households sectors. In these accounts, social transfers in kind are shown as a secondary income transfer from the general government sector to the households sector—hence the term adjusted disposable income—with corresponding adjustments to the final consumption expenditures of the two sectors.

Capital accounts

8.22 The *national capital account* (table 8.3) 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 gross fixed capital formation, 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 gross domestic product account, then these discrepancies must also be taken into account before the derivation of the balancing item. If net lending is negative, then the economy is a net borrower from non-residents.

8.3 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
	Acquisitions less disposals of valuables
	Statistical discrepancy (E) less statistical discrepancy (I)
	Net lending to non-residents
Gross saving and capital transfers	**Total capital accumulation and net lending**

8.23 Table 8.3 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 ASNA due to a lack of a suitable data source.

8.24 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 accounts

8.25 The financial accounts record the net acquisition of financial assets and the net incurrence of liabilities. 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 derived from the relevant capital account. However, due to measurement imperfections, this is seldom the case in practice and a net errors and omissions item is included to achieve balance.

8.26 In the *national financial account* (table 8.4), 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. 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.

8.4 NATIONAL FINANCIAL ACCOUNT

FINANCIAL ASSETS	**LIABILITIES AND NET WORTH**
Net acquisition of financial assets with rest of the world	Net incurrence of liabilities with rest of the world
	Net errors and omissions
	Net lending
Changes in financial assets	**Changes in liabilities and net worth**

Balance sheet and related accounts

8.27 The *national balance sheet* (table 8.5) 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 difference is net worth. 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.

8.5 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	
Non-produced assets	
Tangible	
Intangible	
Financial assets with the rest of the world	
Total assets	**Total liabilities and net worth**

8.28 The assets shown in the table above include entries for valuables and intangible non-produced assets. While conceptually these assets should be recorded in the balance sheets, they are currently not recorded in the ASNA balance sheets due to a lack of suitable data sources.

Changes in balance sheets accounts

8.29 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 accounts

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

8.31 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 accounts) and the difference between the two, i.e. the balance of payments net errors and omissions item.

RELATIONSHIPS AMONG KEY AGGREGATES

8.32 Table 8.6 shows the relationships among the key national accounting aggregates. For the sake of exposition, it is assumed that there are no statistical discrepancies (including net errors and omissions).

8.6 RELATIONSHIPS AMONG KEY AGGREGATES

1 GDP (Gross Domestic Product) = C + G + I + X - M

Explanation

From table 8.1, we know that GDP

- equals final consumption expenditures by households (C) and government (G)
- plus investment in fixed capital and inventories (I)
- plus exports less imports of goods and services (X - M)

2 GDP = CoE + GOS + GMI + NT

Explanation

From table 8.1 we know that GDP

- equals compensation of employees (CoE)
- plus gross operating surplus (GOS) and gross mixed income (GMI)
- plus taxes less subsidies on production and imports (NT)

3 GNDY (Gross National Disposable Income) = CoE + GOS + GMI + NT + NPI + NSI

Explanation

From table 8.2 we know that gross national disposable income (GNDY)

- equals the income components of GDP (i.e. CoE, GOS, GMI, NT)
- plus net primary income receivable from non-residents (NPI)
- plus net secondary income receivable from non-residents (NSI)

4 GNDY = GDP + NPI + NSI

Explanation

For CoE + GOS + GMI + NT in equation 3, we substitute GDP from equation 2

5 GNDY = C + G + I + X - M + NPI + NSI

Explanation

For GDP in equation 4, we substitute C + G + I + X - M from equation 1

6 CAB (Current Account Balance) = X - M + NPI + NSI

Explanation

From the balance of payments we know that the current account balance

- equals exports less imports of goods and services (X - M)
- plus net primary income receivable from non-residents (NPI)
- plus net secondary income (current transfers) receivable from non-residents (NSI)

7 GNDY = C + G + I + CAB

Explanation

Same as equation 5, but with CAB replacing X - M + NPI + NSI (see equation 6)

8 GS (Gross Saving) = NS + CoFC

Explanation

Gross saving (GS) is defined to equal net saving (NS) + consumption of fixed capital (CoFC)

9 GS = GNDY - C - G

Explanation

From table 8.2 we know that gross saving (GS)

- equals GNDY
- minus household and government final consumption expenditure (C + G)

10 GS = I + CAB

Explanation

From equations 7 and 9 we know that GS = C + G + I + CAB - C - G, and C and G cancel out.

11 CAB = GS - I

Explanation

The terms in equation 10 have been rearranged

...continued

8.6 RELATIONSHIPS AMONG KEY AGGREGATES—*continued*

12	Net lending (NL)	=	GS + NCT - I - NPNFA
	Explanation From table 8.3 we know that net lending (NL) • equals gross saving (GS) plus net capital transfers from non-residents (NCT) • minus investment in fixed assets and inventories (I) • minus net acquisitions of non-produced non-financial assets (NPNFA) Note: Conceptually, net acquisitions of valuables should also be subtracted, but these transactions are currently not recorded in the ASNA		
13	NL	=	CAB + NCT - NPNFA
	Explanation Same as equation 12, but with CAB replacing GS - I (from equation 11)		
14	NL	=	NFA - NLN
	Explanation From table 8.4 we know that net lending (NL) equals the net acquisition of financial assets with non-residents (NFA) less the net incurrence of liabilities to non-residents (NLN)		

RELATIONSHIPS AMONG KEY AGGREGATES *continued*

8.33 In the table above, it should be noted that gross saving (GS) reflects the saving of all the domestic sectors of the economy, and not just the households sector's saving.

DIFFERENCES BETWEEN THE ASNA AND SNA93 PRESENTATION OF ACCOUNTS

8.34 There are some differences in the presentation of accounts in the ASNA and SNA93. These are:

- the ASNA GDP account is a combination of the SNA93 production account and generation of income account; and
- the ASNA income accounts are a combination of the SNA93 allocation of primary income, secondary distribution of income, and use of income accounts.

8.35 There are also minor differences in the way information is presented within the accounts and in the level of detail shown.

CHAPTER 9 THE INPUT-OUTPUT FRAMEWORK

INTRODUCTION

9.1 The ASNA includes symmetric input-output tables (for the definition of 'symmetric' see paragraph 9.2) as well as closely related supply and use (S-U) tables. Both types of tables are known as input-output tables. Input-output tables provide a means of undertaking detailed analysis of the process of production and the use of goods and services (products), and of the income generated in that production. The concepts and definitions used for the S-U tables and the input-output tables of the ASNA are the same as in the rest of the system. For a detailed discussion of the nature of input-output and supply and use tables see Chapter 15 of SNA93.

9.2 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 input-output 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 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 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).

9.3 The input-output 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 input-output 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 input-output 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, 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.

9.4 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.

9.5 The symmetric input-output tables are also an important part of the ASNA, serving as a well-established tool for various analytical purposes related to production.

9.6 The symmetric input-output tables are generally based on 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. Readers interested in a detailed description of constructing symmetric input-output tables should refer to the *Handbook on Input-Output Table Compilation and Analysis* published by the Statistics Division Department of Economic and Social Affairs of the United Nations.

THE INPUT-OUTPUT CONTEXT

9.7 In national accounting and economic analysis two kinds of input-output tables (or matrices) are referred to:

- S-U tables; and
- symmetric input-output tables.

9.8 The S-U tables are sometimes referred to as rectangular input-output tables, make and use tables, supply and disposition of products, etc. In the ASNA, the term 'S-U tables' is used. The symmetric input-output tables are also often termed 'square' (input-output) tables or matrices, Leontief-type input-output tables (matrices), etc. The square symmetric tables are either product-by-product or industry-by-industry. In this chapter the term 'tables' is used rather than 'matrices', and the terms 'product-by-product' tables and 'industry-by-industry tables' are used to describe tables in which the rows and columns both relate to products, or industries, respectively.

9.9 The concepts and definitions in the S-U tables are the same as elsewhere in the ASNA.

9.10 The S-U and input-output tables also adopt the accounting rules of the ASNA, i.e. the definitions, conventions, etc., which are employed with respect to transactions and transactors apply equally to the input-output framework.

9.11 Issues of particular importance to the input-output tables include:

- statistical units; and
- the distinction between principal, secondary and ancillary activities;

both of which are discussed below.

Statistical units for input-output

9.12 Institutional units may engage in several different kinds of productive activities simultaneously. For the detailed analysis of production, the system therefore recommends that they should be partitioned into separate establishments, each of which engages in only a single kind of productive activity at a single location. Industries are then defined as groups of establishments engaged in the same kind of productive activities. Ideally, the industries in the system would be composed of establishments that are homogeneous production units.

9.13 A unit of homogeneous production is defined as a producer unit in which only a single (non-ancillary) productive activity is carried out. However, the unit of homogeneous production is not normally observable and is more an abstract or conceptual unit underlying the symmetric (product-by-product) input-output tables.

9.14 To be operational for statistical compilation purposes the establishment needs to be sufficiently distinct as a production unit to supply meaningful information. For the S-U tables, the system needs a unit which can be observed and for which data can be collected. Furthermore, the choice of units is often dictated by the units which are being used in source data collections.

Principal, secondary and ancillary activities

9.15 When an establishment engages in more than one kind of activity, by reference to a given classification of activities, it is necessary to observe the fundamental distinction between principal and secondary activities on the one hand and ancillary activities on the other:

- the principal activity of an establishment is the activity for which gross value added exceeds that for any other activity carried out within the same unit;
- a secondary activity is an activity carried out within a single establishment in addition to the principal activity; and
- an ancillary activity is a supporting activity which is undertaken in order to create the conditions within which the primary and secondary activities of an enterprise can be carried out.

9.16 The establishment unit used for the sequence of accounts for industries may include principal as well as secondary productive activities within it, although secondary activities should be separated as far as practically possible. The further treatment of secondary production is one of the central issues met in the construction of symmetric input-output tables.

Principal, secondary and ancillary activities *continued*

9.17 Ancillary activities typically produce outputs of services which are used as inputs into almost all kinds of productive activities, and their values are likely to be small compared with those of the principal and secondary activities of the enterprise. Consequently, they are treated as integral parts of the principal or secondary activities with which they are associated. In a production account and input-output context, ancillary activities are treated as follows:

- outputs of ancillary activities are not explicitly recognised and recorded in the system;
- inputs into ancillary activities are treated as inputs into the principal and secondary activities which they support; and
- value added is not identified separately as it is combined with that of the principal and secondary activities. However, satellite analysis might try to identify inside the producing units some ancillary activities and their output.

9.18 In addition, output of an industry may include more than a single product when two or more products are produced simultaneously by a single productive activity as 'joint products' (e.g. molasses linked to the production of sugar; natural gas linked to crude oil). Joint products may be distinguished as the principal product (by largest proportion) and the by-product (or by-products). In practice, by-products are often treated in the same way as secondary products in the input-output framework.

BASIC STRUCTURE OF THE INPUT-OUTPUT AND ASSOCIATED TABLES

9.19 Preceding sections of this chapter referred to goods and services accounts, S-U tables and input-output tables. Technically these accounts or tables are variants on a theme. They each describe the supply and disposition of the products, or outputs of industries, of an entire economic system for a particular period. The differences between these various types of tables relate to differences in valuation and structure which do not need further elaboration here. Readers interested in more detail regarding these differences should refer to Chapter 15 of SNA93.

9.20 The remainder of this chapter describes aspects of an industry by industry input-output table, which is the most complex of this family of tables and is the main input-output table published by the ABS. Goods and services accounts and S-U tables are essentially simpler constructs of these tables.

9.21 Input-output tables may be compiled for industries or products (or both), but they are similar in essentials. As explained in the introduction to this chapter, the distinguishing characteristics of input-output tables, as contrasted to supply and use tables, is that they are symmetric and, as explained later in this chapter, the preferred valuation of transactions is at basic prices.

BASIC STRUCTURE OF THE INPUT-OUTPUT AND ASSOCIATED TABLES
continued

9.22 This section describes an industry-by-industry table, which is the type of table published by the ABS. A row in the table shows the disposition of the output of an industry and a column shows the origin of inputs into an industry. Since the output of an industry must be equal to the sum of its inputs (including gross operating surplus), the row total for an industry must be equal to the corresponding column total. They are simply two sides of an accounting identity.

9.1 INDUSTRY-BY-INDUSTRY MATRIX

	To / From	Row Prefix	Intermediate Demand					Intermediate usage (sub-total)	Final Demand							Final Demand (sub-total)	Total supply (grand total)
			Agriculture, etc.	Mining	Manufacturing, etc.	Construction	Services		Final consumption exp. – household	Final consumption exp. – government	Gross fixed capital form. – private	Gross fixed capital form. – public enterprises	Gross fixed capital form. – general government	Changes in inventories	Exports of goods and services		
	Column Prefix		0101–0400	1101–1500	2101–3701	4101–4102	4501–9601		Q1	Q2	Q3	Q4	Q5	Q6	Q7		
Intermediate inputs	Agriculture	0101–0400	QUADRANT 1 INTERMEDIATE USAGE						QUADRANT 2 FINAL DEMAND								
	Mining	1101–1500															
	Manufacturing, etc.	2101–3701															
	Construction	4101–4102															
	Services	4501–9601															
	Intermediate Inputs (sub-total)																
Primary inputs	Compensation of employees	P1	QUADRANT 3 PRIMARY INPUTS TO PRODUCTION						QUADRANT 4 PRIMARY INPUTS TO FINAL DEMAND								
	Gross operating surplus and gross mixed income	P2															
	Taxes on products (net)	P3															
	Other taxes on production (net)	P4															
	Imports	P5															
	Australian production																

corresponds to aggregates shown as components of gross domestic product, income approach

corresponds to aggregates shown as components of gross domestic product, expenditure approach

BASIC STRUCTURE OF THE INPUT-OUTPUT AND ASSOCIATED TABLES
continued

9.23 The basic structure of an industry-by-industry table with direct allocation of imports is shown in table 9.1. The notation of rows and columns is that used in *Australian National Accounts: Input-Output Tables* (Cat. no. 5209.0). Flows between domestic industries are shown in Quadrant 1 (rows and columns 0101 to 9601). This is usually referred to as the inter-industry quadrant. Each column in this quadrant shows the intermediate inputs into an industry in the form of goods and services produced by other industries, and each row shows those parts of an industry's output which have been absorbed by other industries. For example, the cell at the intersection of row i and column j shows how much output of industry i has been absorbed by industry j for current production. Disposition of output to categories of final demand is shown in Quadrant 2, comprising rows 0101 to 9601 and columns Q1 to Q7. Quadrant 3 (rows P1 to P5 and columns 0101 to 9601) shows entries usually referred to as primary inputs: compensation of employees; gross operating surplus and gross mixed income; imports; and various types of taxes on production. These inputs differ from the intermediate inputs in that they are not part of the output of current domestic production.

9.24 Quadrants 1 and 2 together show the total usage of the goods and services supplied by each industry. Total usage equals total supply because Quadrant 2 includes changes in inventories (which may be positive or negative). Quadrants 1 and 3 together show the inputs used to produce the total supply (outputs) of each industry. The sum of the inputs equals total supply (outputs) because the primary inputs in Quadrant 3 include gross operating surplus and gross mixed income (which may be positive or negative conceptually).

9.25 In some tables, the figures shown for total supply from each industry include not only Australian output but also similar products which are imported; these tables are said to have an indirect allocation of imports. When the tables are arranged in this way, the amounts of inputs into one industry supplied by each of the other industries reflect technological relationships between all inputs into the industry, whether or not they are domestically produced, and the output of that industry. The assumption of a functional relationship between an industry's inputs and its output is implicit in many uses of input-output tables, and this is an important consideration in the design of the tables.

Sectoring

9.26 In the preceding description of the basic structure of input-output tables, a row or column in Quadrant 1 was said to refer to an industry. However, in some tables a row or column may represent a product or a group of products rather than an industry. For this reason, rows and columns in Quadrant 1 are called sectors. This part of the chapter discusses the possible content and number of sectors, and the problems and analytical implications of the sectoring used.

9.27 Input-output tables are mostly used to investigate the likely effects on the rest of the economy of observed or postulated changes in a part of it, such as may occur because of an increase or decrease in the demand for a product, substitution of imports for local production, increase in wages, etc. It is clearly desirable that the part of the economy being studied is isolated in a sector, and that 'sector' is defined in terms which satisfy the requirements of users of the table. However, it is not always possible to satisfy these criteria because some users wish to study a broad area of the economy, but others are interested only in a narrowly defined industry or product.

9.28 Appropriate sectoring has an important influence on the stability of input-output coefficients (i.e. the inputs to an industry divided by the output of the industry). It ensures that the input structure of a sector changes as slowly as possible, which means that the input-output tables remain useful for longer. Therefore, it is important in planning the tables that the sectors should be defined so as to satisfy as far as possible the homogeneity assumption, which may be described as follows:

- each sector produces a single output (i.e. all the products of the sector are either perfect substitutes for one another or are produced in fixed proportions);
- each sector has a single input structure (i.e. one which does not vary in response to changes in product mix); and
- there is no substitution between the products of different sectors.

9.29 The stability of coefficients is affected by the interaction of two factors: aggregation into a single sector of products with different input structures, and changes in the sector's product mix over time. This is very important when the input-output coefficients are only available from infrequent surveys, and it is therefore necessary, when compiling input-output tables, to assume that the coefficients observed in one year apply in neighbouring years, at least as a starting point. For example, if the textile industry is defined as a single sector, the coefficients for yarn inputs will be different for textiles produced from different yarns and will change if the proportions of these textiles change. Again, in an industry such as motor vehicles, trucks may contain a significant amount of timber whereas cars do not. If an increase in fixed capital formation leads to a higher demand for trucks than in the survey year, the projected requirements for timber will be understated because the input coefficient in the survey year relates to timber used to produce trucks and cars in the proportions for that year. Such problems will arise in industries producing a range of products, particularly when each product has a different input structure.

9.30 Even in large input-output tables there is substantial aggregation, which leads to a departure from these ideals and affects the homogeneity of sectors. There are two ways in which the aggregation can be made. One is a grouping of industries, leading to an industry-by-industry table. The other is a grouping by products, leading to a product-by-product table. These two approaches have different implications for homogeneity and therefore for the subsequent analytical uses of the tables. No system of sectoring can completely eliminate the aggregation problem, but an appropriate sectoring can keep it within acceptable limits. The choice of sectors depends partly on the practical problems of compilation.

9.31 It would appear, at first sight, that it might be best to define sectors as fairly narrow product groupings. This would go close to satisfying the first two criteria of homogeneity, but there are disadvantages in defining sectors this way. The resulting tables may be too detailed for many uses. They may take too long to compile. Necessary data may not be available in sufficient detail. In particular, when an establishment produces products classified to different sectors, there are difficulties in obtaining separate details of the inputs into the different product sectors. In an economy such as Australia there may be the overriding disadvantage that the resulting estimates could not be published anyway, because they would be confidential. Finally, it is likely that the third homogeneity criterion would not be satisfied. If, for example, electric cables made of aluminium were in a different sector from cables made of copper, there could well be substitution between the products of the two sectors and some conclusions drawn from the tables could be of doubtful validity.

9.32 If industries are chosen as sectors, homogeneity may be impaired by the wide range of products produced by the establishments in some industries. Products are described as primary to an industry when they are produced mainly by that industry. The secondary outputs of an industry are those outputs which are primary to another industry. Where the range of primary products for a given industry is wide, the output of that industry may contain products which may have very different input structures. In addition, they may contain not only products primary to the industry but also secondary products (primary to other industries) and the corresponding inputs. If, for example, the basic iron and steel industry also produces non-ferrous castings, the column for this industry will show inputs of non-ferrous metals and the row will include sales to industries using non-ferrous castings. Such a presentation may be unsatisfactory to users who are interested in the production and disposition of basic iron and steel products only. More importantly, if either of these problems exists, the second criterion of homogeneity will not be satisfied and the input coefficients will vary in response to changes in product mix. Unless the production of secondary products represents a fixed proportion of the industry's output, the requirements calculated from the table may be misleading.

9.33 Often there is no necessary connection between the production of primary and secondary products, and it cannot be expected that the proportions will remain constant. However, where the secondary products are joint products or by-products (such as production of sulphuric acid in basic metal smelting) the proportions will normally remain constant and there will be no problem on that account. Nevertheless, a problem may arise in this case because a change in demand for these products is more likely to affect the output of specialist producers of those products than that of the industries which produce them as by-products.

9.34 The extent of secondary production (products primary to another industry) depends on the range of products produced by individual establishments and on whether the establishments are grouped into a large number of narrowly defined industries or a smaller number of broadly defined industries. With narrowly defined industries, a large proportion of some products will be produced by industries to which the products are not primary. This tends to conflict with all the homogeneity requirements and, most seriously, it conflicts with the non-substitution requirement. Where significant proportions of a product are produced by a number of industries there can be easy substitution between that product produced by one industry and the same product produced by another industry. There is then a very weak link between the demand for that product and the output of a single industry. Thus, given basic statistics of establishments classified to narrowly defined industries, combining some of these industries will improve homogeneity in one important respect. There is a limit, though, because the improvement may be offset by a more heterogeneous product mix. Also, provision should be made, if possible, for users wishing to undertake detailed product or industrial analyses.

9.35 As well as conceptual considerations, the choice of sectors is influenced by the nature of the statistical data available. Thus, detailed information on sales or output is normally available for products, but information on costs or inputs may not be available. The total value of inputs used by an establishment or enterprise is often the only information available. As it is necessary to relate inputs to outputs, the statistical data normally available have to be arranged to bring out this relationship.

9.36 Product-by-product tables are theoretically more appropriate than industry-by-industry tables for some analytical purposes, but the differences between these types of tables arise only because of secondary production and depend on the extent of this production. If there is a significant amount of secondary production, the use of industry-by-industry tables for product analyses will produce less accurate results. However, if the extent of secondary production is small to start with, or if it has been possible to minimise it by appropriate sectoring and redefinition of industries (i.e. transferring some activity attributed to an industry to another, more appropriate, industry), the results obtained by using an industry-by-industry table may differ only slightly from the results which would have been obtained if a product-by-product table had been used instead.

Sectoring *continued*

9.37 The ABS prefers to compile industry-by-industry tables for a number of reasons. First, detailed information on inputs is not normally available for products. Therefore, the estimates of inputs in a product-by-product table must be based on assumptions and approximations with a consequent loss in accuracy. Second, experience in some overseas countries shows that product-by-product tables prepared entirely using the industry technology assumption (i.e. that a product has the same input structure wherever produced) can lead to anomalous or even unacceptable results. These anomalies could be avoided by using mixed assumptions as SNA93 recommends, but this approach is very expensive. Finally, it appears that most of the analytical applications of input-output statistics in Australia can be satisfied using industry-by-industry tables. Thus, analysis of the effects of changes in factor costs, productivity, incidence of taxes on production and imports, and primary input content of demand can be met by tables of this type.

Basic tables

9.38 Regardless of whether products or industries are used to define the sectors, the initial assembly of data is the same. It is necessary to record the product flows in the economy in a way suitable for input-output analysis. A system of building blocks is used, each of which shows, for a product (or, more commonly, a combination of products):

- its origin, or source of supply, divided into domestic production from various industries and imports;
- its destination, classified into usage by various industries and final demand categories; and
- the difference (or margin) between the basic price and the purchasers' price of each product.

9.39 Recording supplies by industry of origin does not present any difficulty apart from the necessity to classify imports in the same way as locally produced products. The destination of products is more difficult to determine. The first requirement is information on the usage by each industry and final demand category, both in total and for the constituent products. Although the using industries can supply information on the nature of their inputs, the descriptions may be broad and may differ from descriptions used by the suppliers of the same products. Where the information is not available in sufficient detail it must be estimated.

9.40 Once these building blocks are ready they are arranged into four basic tables. The first of these is the *supply table*. It shows output of domestic industries and imports in the columns and output of products primary to these industries in the rows. Characteristically, the largest entries are on the main diagonal because an industry mainly produces products primary to it. For a large proportion of the cells in the supply table the estimate of the value of output is nil. In order to save space and assist readability, only cells with non-zero values are presented in the published supply table. This table provides insights into the way the production of products by industries is organised. The columns of the table show, for each industry, the products it produces (or the 'industry product mix', as it is sometimes called) and the extent to which each industry specialises in the production of products primary to it as well as the product composition of imports.

9.41 The *use table* has product groups and primary inputs in its rows, and industries and final demand categories in its columns. The rows of this table record the total supply of products, whether locally produced or imported, and show how these products are used by industries as intermediate inputs to current production and by final demand categories. Further down, the rows designated by prefix 'P' show the primary inputs which have been purchased by industries and by final demand. Reading down the columns one can find the composition of 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.

9.42 The third basic table is the *imports table*. It shows in the columns the industries to which the imported products would have been primary had they been produced in Australia, and in the rows the usage of these products by industries and final demand categories. This dissection is shown only for competing imports, i.e. those products which are both produced domestically and imported, so that substitution between the two sources of supply is possible. It is not shown for complementary imports which, by definition, are of a kind not produced in Australia; nor for re-exports, which are goods imported into Australia and then exported without having been used or transformed in any way. These are recorded in separate columns rather than in the columns of industries to which they would have been primary if they had been produced in Australia. The imports table has not been included in the I-O publication, but is available on request (see Appendix D of Cat. no. 5209.0).

9.43 The fourth basic table is the *margins table*, which shows the difference between the basic price and purchasers' price of all flows in the use table. The margins table is the sum of separate tables for each type of margin (e.g. taxes on products (net), wholesale, retail). Table 3 in Cat. no. 5209.0 provides a summary margins table. The component margins tables are not included in Cat. no. 5209.0, but are available on request.

Basic tables *continued*

9.44 These four basic tables are simply a record of the estimated flows which occur in the process of production. However, the use table is not symmetric, which makes it unsuitable for some analytical purposes. It can be made symmetric by reorganising it so that both rows and columns refer either to industries or to products. In the first case, rows of the use table have to be adjusted to show industries purchasing industry output rather than products. In the second case, columns of the use table have to be adjusted to show inputs relevant to the production of products. These adjustments lead to symmetric flow tables which are either industry-by-industry or product-by-product tables. Only industry-by-industry tables are published by the ABS.

SPECIAL TREATMENTS ADOPTED IN COMPILING INPUT-OUTPUT TABLES

9.45 The content and meaning of the tables depend also on some other aspects of compilation, particularly:

- treatment of intra-industry transactions;
- allocation of imports;
- coverage of transactions;
- valuation of transactions;
- basic margins; and
- taxes and subsidies on products.

There are various methods available for dealing with each of these, and several types of tables can be prepared from the same basic data.

Treatment of intra-industry transactions

9.46 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.

- The output of an industry can be defined as the total value of all flows of products produced by the establishments 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 (Class 2801) would consist 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 an establishment 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.

Treatment of intra-industry transactions *continued*

- A second possible definition of the output of an industry confines output to products produced by establishments 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 establishment could be omitted entirely or counted either partly or wholly depending on whether they were used by another establishment of the same enterprise or by a different enterprise.
- 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 establishments in industry i belonging to the same enterprise, but also all flows between establishments in industry i belonging to different enterprises. If this definition of output is used, the input-output table is said to be net and the main diagonal of an industry-by-industry table is empty. If one of the other definitions is used the table is gross and there are entries on the main diagonal.

9.47 For 1974–75 and subsequent years, the 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. 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 is measured on a net basis.

Allocation of imports

9.48 Various ways are available to record imports in input-output tables. The main ones are:

- direct allocation of imports, which involves allocating all imports directly to the sectors 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, which involves first recording all imports as adding to the supply of the sector to which they are primary and then allocating this supply along the corresponding row of the table to using sectors. 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.

Each of these methods has advantages from an analytical point of view but each also can lead to conceptual and compilation problems.

Allocation of imports
continued

9.49 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 sectors. Of course, it is possible to proceed if one assumes that each using sector 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 1,000 products and 107 industries) which were subsequently aggregated for publication.

9.50 Indirect allocation of imports is appropriate, in the sense that it will result in stable input-output coefficients, where the inputs to the domestic sector 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 is 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 only 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.

9.51 The third method modifies the second to take account of complementary imports. To apply this method, it is necessary to distinguish between competing and complementary imports, so that the latter can be allocated directly to the using sectors. This distinction may appear to be obvious at first sight, but in practice it is difficult to apply. A competing import can be defined as one which is a good substitute for a domestically produced product. However, in general, this cannot be determined objectively and so is largely a matter of judgement. Moreover, each competing import has to be matched with a domestically produced product, and this also presents difficulties because there is rarely a one-to-one correspondence between domestically produced and imported items.

9.52 Complementary imports could be defined as those for which no suitable substitute is produced domestically, but determining what is a suitable substitute is largely a matter of judgement. Since complementary imports should be allocated directly, it is necessary to identify their destination, which may present some practical difficulties. However, the number of products involved is usually small, and the nature or the description of these products frequently provides sufficient guide to their probable destination.

Allocation of imports
continued

9.53 In principle, complementary imports are those products not produced in Australia (e.g. natural rubber), but the practice is somewhat different. All imports (goods and services) for which there is insufficient information to classify to a specific industry of origin, are treated as complementary imports in the ASNA tables.

Coverage of transactions

9.54 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. 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 (Q6) 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. Input-output tables do include some elements which are not market transactions, such as the imputed rent of owner-occupied dwellings and some home-produced food.

Valuation of transactions

9.55 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 is 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. However, delivery charges that are not separately invoiced are included in the basic price.
- Producer's price is 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, but includes delivery charges not separately invoiced.

Valuation of transactions
continued

- Purchaser's price is 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 are excluded from purchasers' prices.

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.

Margins

9.56 If the transactions are valued at basic prices, the margins are recorded as inputs from the appropriate sector (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 sector is reduced by a corresponding amount.

9.57 Which ever 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.

9.58 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.

9.59 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

9.60 The treatment of taxes on products in input-output tables creates special problems which can only be solved by the use of conventions. 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. 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 procedure 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 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 results in lack of uniform valuation of product flows and in the distortion of input-output relationships.

9.61 Product specific subsidies are treated as negative taxes on products, and the amounts shown in row P3 represent the difference between the two. 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.

USING INPUT-OUTPUT TABLES FOR ANALYSIS

9.62 The basic tables and the industry-by-industry tables are essentially an accounting record of the flows in the economy in the reference year. Using simplifying assumptions the input-output estimates can serve many analytical purposes. For instance, it is possible to estimate the levels of output of the production sectors required by a given final demand. The effect on other industries of an additional final output of $100 million of the motor vehicles and parts; other transport equipment industry, or of a 25 per cent change in exports of minerals, can be calculated by assuming that average and marginal utilisation rates are the same. An impact analysis of this kind may be concerned with one, several or all sectors of the economy and can be carried out with the aid of the requirements tables described below. Because relative prices are continually changing and do change substantially from one year to the next (e.g. internationally traded basic products), it is useful to regard input-output tables as representing underlying quantities and technological relationships rather than values and value relationships. Even factor payments (compensation of employees; and gross operating surplus and gross mixed income) can be viewed as representing underlying quantities, namely quantities of employee services and of entrepreneurial and capital services. Unless the analyst makes adjustments for price changes, all proportions and values are in terms of the relative and absolute prices of the reference year.

Direct requirements coefficients

9.63 A very simple application of the input-output table is calculating inputs as a percentage of the output of an industry and using these percentages for estimating the input requirements for any given output of that industry. In all the tables included in the I-O publication (including tables with indirect allocation of imports), 100 per cent always represents total Australian production.

9.64 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 were characterised by a direct allocation of competing imports the coefficients in Quadrant 1 would only refer to the requirements for inputs from domestic production.

9.65 If the flow table were characterised by an indirect allocation of competing imports, the coefficients in Quadrant 1 would include the usage of both imported and domestically produced products. Therefore, 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.

Direct requirements coefficients *continued*

9.66 The coefficients for compensation of employees, gross operating surplus and gross mixed income, taxes on products (net) and other taxes on production (net) are the same regardless of whether they are derived from the tables with indirect or direct allocation of competing imports. However, the coefficients for imports differ between these two types of tables. In the tables with an indirect allocation of competing imports, the entries in Quadrant 3 (the primary inputs quadrant) relate only to complementary imports; 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 import entries relate to all imports used by the industry.

Total requirements coefficients

9.67 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. However, to supply this direct requirement, the mining industry itself requires inputs from the chemicals industry. To produce this indirect requirement of the mining industry, the chemicals industry needs, in turn, additional output from the mining industry, and so on in a convergent infinite series. This 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.

9.68 The requirements can be traced, step by step, throughout the industrial structure, until the increments of output required indirectly from each industry become insignificant (which occurs after a few rounds). If this operation is carried out for all industries and the direct and indirect requirements are added together, a matrix of total requirements coefficients is obtained. However, if the number of industries is large the iterative method is too cumbersome, and so the total requirements are calculated on a computer by the method known as matrix inversion. This is why the matrix of total requirements is frequently described as the inverse matrix and its coefficients as inverse coefficients. In the Australian input-output tables, they are referred to as total requirements coefficients.

9.69 In these tables a coefficient at the intersection of row i (a typical row) and column j (a typical column) represent the units 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. In using these coefficients one should bear in mind the assumptions about homogeneity and proportionality which are their foundation.

Total requirements coefficients *continued*

9.70 It should be noted that coefficients will differ according to the way imports have been allocated in the flows on which the coefficients are based. If the flow table were characterised by a direct allocation of competing imports, the total requirements coefficients in Quadrant 1 would refer only to the requirements for domestic production. Therefore, in using the coefficients, it would be necessary to assume unchanged usage of imports or, alternatively, regulate the coefficients using revised import usage characteristics.

9.71 If the flow table is characterised by an indirect allocation of competing imports, the total requirements coefficients of Quadrant 1 include the usage of both imported and domestically produced products. Therefore, provided that the usage of a product by a particular industry remains unchanged, substitution can take place between imports and domestic production without affecting the size of the coefficients. In using these total requirements coefficients, a separate assessment of the proportion of these requirements which is likely to be satisfied by imports would need to be made, unless it can be assumed that the requirements to meet a specified level of final demand can be satisfied from domestic production.

9.72 All coefficients in the requirements matrices relate to flows from industry to industry. Consequently, the answers obtained by applying these coefficients will be in terms of the output of industries and not of products primary to these industries.

9.73 All tables of total requirements coefficients characteristically have a diagonal entry in excess of 100. These small excesses over 100 shown in all diagonal entries are due to indirect requirements affecting each industry through other industries. This means that to meet 100 units of final demand for the output of a particular industry, the industry itself has to produce those 100 units (for final demand) plus any direct or indirect requirements for its output resulting from its requirement for inputs from itself or from other industries.

9.74 Impact calculations in an open input-output system require independent specification of final demand for the output of each sector in the table. If final demand is specified at purchasers' prices while the answer is sought in basic prices, the reduction of the former to the latter can be carried out with the aid of the reconciliation table which shows the relationship between basic and purchasers' prices.

Specially derived tables

9.75 Instead of being expressed as total output, the requirements can be expressed as primary input content. This amounts to looking at the other side of the fundamental national accounting identity which says that gross national expenditure plus exports of goods and services is equal to gross domestic product plus imports of goods and services. In other words, the final output of any industry is equal to the rewards paid to factors of production (compensation of employees; and gross operating surplus and gross mixed income) and other primary inputs (taxes less subsidies on production and imports) in all industries contributing directly and indirectly to this final output.

Specially derived tables
continued

9.76 Each entry in the total 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. However, each of these entries can also be thought of as the sum of its inputs and hence can be dissected into these individual components. The proportions obtained from the column of the supplying industry in the table of direct coefficients are used. These calculations are based on tables with direct allocation of all imports. According to the proportionality assumption (see paragraph 9.77 below), the amount of each kind of input used by an industry represents a fixed proportion of that industry's output.

Stability of input-output coefficients

9.77 The results of users' analyses will be correct to the extent to which input-output coefficients are stable, which in turn depends on the extent to which the main assumptions underlying the input-output estimates have been satisfied. One of these, the *homogeneity assumption*, postulates that:

- each sector produces a single output (i.e. all the products of the sector are either perfect substitutes for one another or are produced in fixed proportions);
- each sector has a single input structure (i.e. one which does not vary in response to changes in product mix); and
- there is no substitution between the products of different sectors.

The other, called the *proportionality assumption*, postulates that the change in output of an industry will lead to proportional changes in the quantities of its intermediate and primary inputs (i.e. for any output, each of these inputs will be a fixed proportion of the total). Even though these assumptions may be realistic for the reference year, they become progressively less so for later years. The homogeneity assumption may be weakened by changes in product mix (and consequent changes in inputs), introduction of new products and/or materials, and substitution of imports for domestic production or vice versa. The proportionality assumption may be invalidated by economies of scale, technological change or substitution of factors (e.g. more capital, less labour).

9.78 The analyst may be in a position to allow for some of these changes. Estimates of input changes due to changed technology may be obtainable from technical experts, or other sources and adjustments can be made for import substitution. These adjustments should be made to a table of direct requirements or a transactions table, but not to a table showing total requirements. If desired, the adjusted table can then be used to derive new total requirements coefficients.

Stability of input-output coefficients *continued*

9.79 The input-output tables published by the ABS represent an open input-output system because the final demand sectors are exogenous, i.e. determined by factors outside the system. In a closed system, all sectors are defined as interdependent, which means, for example, that household consumption is treated like an industry and its inputs (i.e. the requirements of consumers) are part of the solution. The system in the Australian input-output tables is static because it is providing a view of the economy at a point in time. Dynamic systems introduce explicit periods of time into the model and allow the change from a base period to the target period to be traced.

Multipliers

9.80 An important tool for analysts is the input-output multipliers. These provide a way of answering some of the questions often asked by input-output practitioners. These queries tend to arise because of the types of 'what if?' analysis for which input-output tables can be used (for example, what would be the impact on employment of an x% change in output by the chemicals manufacturing industry). This type of analysis is dependent on a knowledge of input-output multipliers and their shortcomings. Using input-output tables, multipliers can be calculated to provide a simple means of working out the flow-on effects of a change in output in an industry on one or more of imports, income, employment or output in individual industries or in total. The multipliers can show just the 'first-round' effects, or the aggregated effects once all secondary effects have flowed through the system.

9.81 The ABS has published an Information Paper: *Australian National Accounts, Introduction to Input-Output Multipliers* (Cat. no. 5246.0), which provides a guide to the construction, interpretation and use of input-output multipliers.

Types of analysis

9.82 Input-output tables are a powerful analytical tool. Running from S-U tables through symmetric input-output tables to the inverse tables, they are put to use in various kinds of economic analysis. Some of the most important areas in which the input-output framework is used for analytical purposes are listed below and described briefly:

- analysis of production; structure of demand, export ratios, etc.; employment; prices and costs; imports required; investment and capital; and exports;
- analysis of energy and of environment; and
- sensitivity analysis.

9.83 The basic role of input-output analysis is to analyse the link between final demand and industrial output levels. The inverse table, total requirements coefficient in the ASNA context, could be used to assess the effects on the productive system of a given level of final demand. Employment implications are equally important in this respect. Input-output tables can also be used for analysing changes in prices stemming from changes in costs or from changes in taxes or subsidies. The determination of the level of imports is often a vital part of an input-output exercise, particularly in economies where the balance of payments imposes a constraint on their 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 input-output framework might be extended to also cover demands for fixed assets, by relating the investment table to output. One of the standard input-output applications is the analysis between exports and the necessary direct and indirect inputs, some of which may be imported.

9.84 There has been an increased use of input-output for more structural analysis. Two prominent areas might be mentioned: energy and environment. It is possible to calculate the energy content of the different products in intermediate and final demand, and thereby direct and indirect energy needs from energy matrices, either in physical or value terms. The input-output approach is an essential component in environmental analysis, as it enables the determination of direct and indirect sources of pollution by linking data on emissions in physical terms to the input-output tables. The 'pollution' content of final demand can then be calculated. Input-output tables with environment-related extensions are a major component of the basic framework for satellite accounting of the environment.

9.85 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 together 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 services they are a major ingredient in its estimation.

9.86 Finally, input-output could also be used for various kinds of sensitivity analysis. Such analyses reveal the effects if some variables in the output model are changed. Increased attention has also been devoted to dynamic input-output models. The essential distinction of a dynamic model is that it traces the path of the economy from a particular year to the target year, and it may be applied to calculate the requirements of a given final output not only in the current year, but also through direct and indirect capital requirements in all preceding years. Dynamic models look at the future growth path of the economy year by year.

CHAPTER 10 VOLUME AND PRICE MEASURES

CHAIN VOLUME MEASURES

Introduction

10.1 Chain volume measures were introduced into the Australian national accounts in 1998. They were first presented as experimental measures for the expenditure components of GDP in the December quarter 1997 issue of *Australian National Accounts: National Income, Expenditure and Product* (Cat. no. 5206.0), and were an addition to the long-standing constant price estimates which were still the 'official' volume estimates. Subsequently, in the September quarter 1998 issue of Cat. no. 5206.0, the constant price estimates of both the expenditure and production components of GDP were replaced with chain volume measures from the September quarter 1986, and they became the ABS's 'official' volume estimates.

10.2 The reason for having either chain volume or constant price estimates in the national accounts is to provide time series of expenditure and production aggregates which are free of the direct effects of price change. All the current price aggregates of expenditure and production appearing in the national accounts are estimates of the sums of the values of individual transactions. Each of these transactions has two components: a price and a quantity. From one period to another the quantities and prices comprising the transactions change. This means that when the current price value of an aggregate, such as GDP, in one period is compared with the current price value in another period the difference between them usually reflects both changes in quantity and changes in price of the constituent transactions. In order to estimate by how much the 'volume' of GDP has changed between the two periods we need to measure the value of GDP in each period using the same unit prices.

10.3 For many years the ABS derived constant price estimates as a means of measuring changes in the volumes of aggregates. Constant price estimates are derived by fixing the unit prices of goods and services to those of some base year. These base year unit prices are effectively the weights used to combine the quantities of the different goods and services purchased or produced. The unit prices of different goods and services tend to grow at different rates—some at dramatically different rates, e.g. the prices of computer equipment are estimated to have declined by about 75 per cent between 1989–90 and 1997–98, while the prices of most other goods and services have increased. Therefore, over time, the price relativities of some goods and services change appreciably. This adversely affects the usefulness of constant price estimates for periods distant from the base year, and implies that the base year used to derive constant price estimates needs to be changed from time to time. It used to be ABS practice, in common with many other national statistical agencies, to change the base year every five years. However, it has been found that rebasing every five years is commonly insufficient, and SNA93 recommends rebasing every year and linking the resulting indexes to form annually reweighted chain volume measures. ABS analysis of Australian data has confirmed the need to adopt annually reweighted chain volume measures.

Introduction *continued*

10.4 The decision to replace all of the ABS's constant price estimates with chain volume measures was announced on 19 March 1998 in the Information Paper: *Introduction of Chain Volume Measures in the Australian National Accounts* (Cat. no. 5248.0). That paper describes what chain volume measures are, their advantages and disadvantages with respect to constant price estimates, the advantages and disadvantages of different chain volume formulae, and the results of an empirical analysis.

The chaining method

10.5 There are many different ways of compiling a chain volume measure. The essential features of the ABS chain volume measures are as follows:

- Annual chain volume estimates are derived using the Laspeyres formula. Under this formula, year-to-year volume indexes of an aggregate are derived by expressing the value of the aggregate in each pair of consecutive years in the prices of the earlier year, and then dividing the value for the later year by the value for the earlier year. This is equivalent to weighting together the year-to-year volume indexes of the elementary components of the aggregate with the current price values of the earlier year. A year-to-year Laspeyres volume index at time *t* is given by:

$$L_t^V = \frac{\sum Q_t \, P_{t-1}}{\sum Q_{t-1} \, P_{t-1}}$$

where

Q_t = quantities in year t; and

P_{t-1} = prices in the year t-1, the base year for values in year t.

- The year-to-year indexes are compounded to form a long, continuous time series, which is then referenced to the current price value of the latest base year, i.e. the second last year for which there is an annual value. In general, chain volume estimates are not additive, i.e. the accounting relationships that apply to current price data do not generally apply to their chain volume counterparts. Only the values in the reference year and the following year are additive. So by ensuring that the latest base year coincides with the reference year, the ABS approach ensures additivity for the latest two years. An annual chain Laspeyres volume measure in year t, L_t^{CV}, is given by:

$$L_t^{CV} = \sum Q_r \, P_r * \prod_{i=r+1}^{t} \left(\frac{\sum Q_i \, P_{i-1}}{\sum Q_{i-1} \, P_{i-1}} \right) \qquad t>r$$

$$= \sum Q_r \, P_r \qquad t=r$$

$$= \sum Q_r \, P_r * \prod_{i=t+1}^{r} \left(\frac{\sum Q_i \, P_{i-1}}{\sum Q_{i-1} \, P_{i-1}} \right)^{-1} \qquad t<r$$

where

L_t^{CV} = chain Laspeyres volume measure at year t

P_{i-1} = prices in year i-1, the base year for values in period i

P_r = prices in year r, the reference year

Q_i = quantities in year i

Q_{i-1} = quantities in year i-1

Q_r = quantities in year r, the reference year

- Similarly, quarter-to-quarter indexes are derived from quarterly data expressed in the prices of the previous year. These are compounded to form a long, continuous time series, which is then benchmarked (described below) to the annual chain volume series.

10.6 The steps to be followed in compiling annually reweighted chain Laspeyres volume measures for a quarterly series are best illustrated using an example. Set out below are the steps to be followed for household final consumption expenditure (HFCE). Assume that there are *n* financial years of data to be linked, *t =1* to *n*.

- **Step 1**: For each of the 89 elemental components for each State (a total of 712 components) derive volume estimates in the prices of year *t-1* for the five quarters from June quarter year *t-1* to June quarter year *t* for years *2* to *n-1*. For the quarters of the final, incomplete year, year *n*, derive the estimates in the prices of year *n-2*.
- **Step 2**: Sum all 712 components in each time period.
- **Step 3**: Calculate quarter-to-quarter indexes of the aggregate. For each year *t* up to year *n-2*, the indexes from September quarter to December quarter, December quarter to March quarter and March quarter to June quarter are calculated at year *t-1* prices, but the following June quarter to September quarter index is calculated at year *t* prices. For year *n-1* and the final, incomplete year, year *n*, all quarter-to-quarter indexes are calculated at year *n-2* prices.
- **Step 4**: Compound the quarter-to-quarter indexes to form a chain index.
- **Step 5**: Benchmark the quarterly, annually reweighted chain Laspeyres volume index of HFCE to the annual Laspeyres chain volume index referenced to the annual current price value in the reference year.

10.7 All aggregates are formed in this way with the exception of *Changes in inventories*. The procedure produces unsatisfactory results for this aggregate, and so chain volume measures are derived for inventory levels which are then differenced to produce volume measures of changes in inventories. The normal procedure is followed for changes in inventories when it is incorporated in a major aggregate, such as gross domestic product.

10.8 With the release of the June quarter accounts each year another base year is introduced, and because the latest base year is always chosen to be the reference year, the latter is also advanced one year. Rereferencing results in revisions to the levels of the chain volume measures, but it does not result in revisions to growth rates, although growth rates can be revised for other reasons. One reason is that the introduction of a new base year results in revisions to growth rates for the September, December and March quarters of the latest year.

10.9 There are two major reasons for reweighting the quarterly volume measures annually rather than quarterly. First, the prices required to derive quarterly reweighted volume measures for the industry-based measure of GDP are unavailable. Only quarterly reweighted measures of the expenditure-based measure of GDP could be derived. Second, quarterly reweighted measures should only be compiled using seasonally adjusted data, and this would require seasonally adjusting at the most detailed level. The ABS believes that better seasonal adjustments are often obtained by seasonally adjusting at a more aggregate level. Furthermore, some users require quarterly original data. For example, some econometricians much prefer to use original data in their models.

10.10 Benchmarking the quarterly chain volume measures to the annual chain volume measures is done for several reasons. First, it ensures that the quarterly chain volume measures add to the corresponding annual chain volume measures, which are derived from balanced supply and use tables in the prices of the previous year at a more detailed level. Second, in Step 3 above, it was noted that the index for March quarter to June quarter in year *t* is calculated in year *t-1* prices, but that the subsequent index for June quarter to September quarter is calculated in year *t* prices. It turns out that some aggregates are quite sensitive to when the switch is made from using year *t-1* prices to year *t* prices in the calculation of the quarter-to-quarter indexes. If, for instance, the index from March quarter to June quarter in year *t* were calculated at year *t* prices instead of year *t-1* prices, then this index could have quite a different value. As a result, year-to-year growth rates of annualised quarterly chain volume measures can vary substantially from those of the corresponding chain volume measures derived directly from annual data. It has been found also that this variation is greatest for those aggregates, such as GDP, which include changes in inventories. In some quarters the difference between changes in inventories valued in the previous year's prices can be substantially different to changes in inventories valued in the current year's prices, while in neighbouring quarters the difference can be quite small or have the opposite sign.

10.11 A method developed by Pierre Cholette of Statistics Canada is used to benchmark the quarterly flow data to the annual data. Let c_t and b_t denote respectively the unbenchmarked and benchmarked chain volume measures for quarters *t*. The estimates of b_t minimise the sum of $\left(c_t / b_t - c_{t-1} / b_{t-1}\right)^2$ over a moving five year span subject to the b_ts summing to the annual chain volume measure. The values of the b_ts in the central year are used, except at the ends of the series.

10.12 Series are seasonally adjusted prior to chaining, often at an intermediate level. This presents no problem when using multiplicative seasonal factors, but additive seasonal factors—having been derived from chained or current price data—have to be expressed in the prices of the previous year prior to application. Seasonally adjusted chain volume measures are benchmarked to annual chain volume measures in the same way as the original chain volume measures are benchmarked.

The chaining method *continued*

10.13 Although the reference year coincides with the latest base year, the data for the subsequent quarters are not quite additive when generated using the above procedure. This is a consequence of linking on a quarter and using the benchmarking procedure. To ensure additivity over the latest four to seven quarters (i.e. the period from the September quarter following the reference year to the latest quarter), elemental measures from the September quarter following the reference year are added to form the aggregates.

Basic approaches to deriving volume estimates

10.14 As already noted, chain volume estimates are derived by weighting together period-to-period indexes of 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. This section describes the basic approaches taken to derive the elemental volume estimates.

Quantity revaluation

10.15 Two basic approaches can be taken to deriving volume estimates at the elemental level. The first approach uses quantity data to derive constant price estimates: for an individual commodity, the estimate of quantity in each period is multiplied by the price (or average unit value) in some base year. This method, referred to as *quantity revaluation*, can be applied if the commodity 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 quantum). In some instances data constraints lead to the use of a proxy quantity series which differs from the quantity component of the current price series being revalued. For example, the quantum of services sold by an industry may be assumed to move in the same way as the capacity to provide the service. In other cases, where no appropriate quantity data are available, the constant price value of a commodity may be assumed to move in the same way as the constant price value of a related commodity (or commodities), such as other items of output produced within the same industry.

Price deflation

10.16 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 revalue it in the prices of the previous year. While the term *price deflation* suggests that the current price value is being reduced this is not the case when the price index (sometimes called the deflator) in the current period is less than it is in the reference period. In most cases, the price index used is fixed-weighted (i.e. the weights used to combine the constituent price indexes are not changed frequently), but there is one case where the price index is a chain Fisher index (computer equipment) and others where the price index is a chain Paasche price index (gross fixed capital formation for equipment). In those cases where both the price and quantity relativities of the constituents of an elemental component are changing quickly it is important to construct annually reweighted chain price indexes. 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.

Price deflation continued

10.17 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 commodities, 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 quantum changes; and
- if directly relevant price or quantity data are not available to revalue a current price value, then the proxy price movements of related commodities will usually be more accurate indicators than the proxy quantity movements.

10.18 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).

The compilation of chain volume estimates of GDP

10.19 As described in Chapter 4, there are three approaches to deriving estimates of GDP: the income approach, the expenditure approach and the production approach. 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 the income components of GDP either do not have price and quantity dimensions (e.g. gross operating surplus, which is just a residual) 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 an income volume measure of GDP by dividing the current price income estimate of GDP by the implicit price deflator (described later in this chapter) of the expenditure estimate of GDP.

The compilation of chain volume estimates of GDP *continued*

10.20 From 1995–96, annual volume estimates of expenditure and production are compiled in the prices of the previous year in an input-output framework. Volume estimates of the supply of commodities by each Australian industry and imports are confronted and balanced with volume estimates of commodities used by Australian industries, final domestic expenditures, changes in inventories and exports. The balance between supply and use for each commodity category ensures that the volume measure of GDP in the prices of the previous year is the same whether it be 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 volume indexes. These are chained to form annual chain volume estimates.

10.21 From 1994–95, annual current price estimates of income, expenditure and production are compiled in an input-output 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.

10.22 For current price and volume estimates prior to 1994–95, and for quarterly estimates for all years, the estimates using each approach are based on independent sources, and there are usually differences between the I, E 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 the expenditure-based estimates.

10.23 The sources and methods used to derive the various volume estimates are described in the relevant chapters in this manual. Provided below is a summary of the sources and methods used to produce chain volume estimates of GDP using the expenditure and production approaches respectively.

Chain volume estimates of GDP using the expenditure approach

10.24 Quarterly (and annual) chain volume estimates of GDP are compiled by summing volume estimates, expressed in the prices of the previous year, of final expenditures, changes in inventories and exports less imports. The resulting volume estimates of GDP in the prices of the previous year are then chained.

10.25 For most items in household final consumption expenditure, volume estimates are derived by the price deflation method (i.e. dividing current price values in each case by a price index). The available price indexes are, in most cases, fixed-weighted. For some minor items in household final consumption expenditure, where there is a lack of price or quantity data, use is made of implicit price deflators. In the case of computer equipment a chain Fisher price index is used.

Chain volume estimates of GDP using the expenditure approach continued

10.26 With the remaining components of gross national expenditure, a greater degree of approximation and assumption is involved. In particular, a significant part of capital formation is incurred in relation to unique goods that are not homogeneous over time or for which standard units of quantity cannot be devised. Volume estimation is achieved in such cases by making assumptions about changes in prices which would have occurred had price series existed for the unique goods in question. Thus gross fixed capital formation is revalued using import and producer price indexes for equipment, various building price indexes, road construction price indexes and wage cost and material price indexes for other components of engineering construction. In the case of equipment, a complex model is used to allow the weights of the various import and producer price indexes to vary over time. The model uses data for commodity imports and for commodities manufactured in Australia, and various other sources, to estimate the commodity composition of expenditures on equipment in both the private and public sectors.

10.27 The volume estimation of government final consumption expenditure is based on revaluing inputs—the wages paid, and goods and services purchased—rather than on directly estimating the volume of services provided. This is consistent with the methods used to compile the current price value of final consumption expenditure on goods and services by general government, which is defined as the sum of material costs, labour costs and consumption of fixed capital less any amounts received through charges levied for goods and services provided by general government bodies (see Chapter 14). The volume estimates of wages, and goods and services purchased, are derived using wage cost indexes (compiled as annually—reweighted chain Laspeyres indexes) and material price indexes, and volume estimates of consumption of fixed capital are derived using a perpetual inventory model (described in Chapter 16). Some of the implications for productivity measurement of this method of revaluing government final consumption expenditure are discussed briefly below.

10.28 Import and producer price indexes are used extensively to derive volume estimates of the book values of inventory levels. These are differenced to obtain volume estimates of changes in private non-farm inventories. Farm and public authority inventories are mostly quantity revalued. A number of assumptions are made in the volume estimation of inventories (described in Chapter 17).

10.29 Most exports of goods are quantity revalued. Volume estimates of most of the balance are derived using export price indexes. Volume estimates of exports of services are derived using a range of price indexes, including the consumer price index. The great bulk of the volume estimates of imports of goods and services are obtained by price deflation (using components of the import price index and some price indexes from other countries).

Chain volume estimates of GDP using the production approach

10.30 The gross value added of an industry at current prices is defined to be the difference between the value of output and the value of goods and services (intermediate input) used up in the process of production. In the national accounts, therefore, it is natural to derive volume estimates of gross value added as the difference between volume estimates of output and intermediate input. By mirroring the current price identity, this method ensures the same consistency in the volume accounts as exists in the current price accounts. This is commonly called the *double deflation* (or net output) method and is used to derive all the annual industry gross value added estimates from 1995–96.

10.31 Double deflation is used in the annual supply and use tables to derive annual estimates of gross value added for each industry in the prices of the previous year. Wherever possible price indexes directly relating to the outputs and inputs are used, but in many cases such price indexes are unavailable. Proxies are often used that are largely based on input prices, i.e. wage cost and material price indexes. Volume estimates of wholesale and retail margins are derived on the assumption that they have the same growth rate as the sales of commodities they relate to.

10.32 With the exception of agriculture, the data required to use double deflation to derive quarterly volume estimates are unavailable, and so an alternative method must be used. For most industries it is assumed that the volume measure of gross value added grows at the same rate as the volume measure of output (the *output indicator* method). The assumption underlying this method is that in volume terms the ratio of intermediate input to output is stable. In order to ameliorate departures from this assumption as much as possible, quarterly output volume indexes at as detailed a level as practicable are weighted together using the current price estimate of gross value added in the earlier of the two years. The same approach is used for annual data prior to 1995–96.

10.33 For all the goods-producing industries (except agriculture) and nearly all of the private sector dominated service industries volume estimates of output, or proxies for output, are used as quarterly volume indicators of gross value added.

10.34 For service industries, in particular, it is often difficult (if not impossible) to measure the true changes in the quantum of output. In these circumstances, the volume estimation of output is achieved by using the best available proxies. The examples in the following two paragraphs are intended to clarify this point.

Chain volume estimates of GDP using the production approach continued

10.35 Two basic components are assumed to comprise the output of the transport industry—passenger movement and freight movement. A greater degree of homogeneity is introduced by identifying different kinds of transport—road, rail, air and water transport—and by distinguishing between country and suburban passengers where appropriate, and between a number of different kinds of freight (e.g. mail, livestock, coal or oil). In practice, the measures of quantity used for each mode of transport are passenger-kilometres and tonne-kilometres. However, such measures make no allowance for joint service components such as loading, or for quality changes resulting from variations in speed or frequency of services.

10.36 For the wholesale and retail trade industry, output is assumed to be proportional to the quantum of goods handled. As a result, no allowance is made for changes in the quality of service provided in handling these goods such as more prompt service or extended shopping hours. In the case of the banking industry the principal quarterly output measure is the real value of bank financial assets. Likewise, this measure takes no account of changes in the quality of banking services.

10.37 In the absence of satisfactory alternatives, hours worked data are used as the quarterly indicators of the volume movements in gross value added in the remaining service industries: property and business services; government administration and defence; education; health and community services; much of personal services; and part of cultural and recreational services. The assumption underlying this procedure is that there is no change in volume gross value added per hour worked, i.e. labour productivity is constant.

10.38 In the annual supply and use tables, annual volume measures of the labour income components of the outputs of the general government-dominated industries are derived by deflation, using wage cost indexes. As wages account for the bulk of general government output (defined to be equal to input), this is almost akin to using hours worked as the indicator of change. However, there is one difference worth noting: to the extent that changes in the mix of high and low paid jobs reflect changes in the average skill or productivity level of the workforce, wage-deflated estimates—unlike hours worked based estimates—will reflect productivity growth. It should be noted, though, that such a measure of productivity growth is likely to be only partial.

PRICE INDEXES

Introduction

10.39 Just as constant price estimates were replaced by chain volume measures, so the previously published fixed-weighted price indexes have been replaced by chain price indexes. Thus, there are two types of price index published for each of the expenditure aggregates in the national accounts: chain price indexes and implicit price deflators (IPDs) derived from chain volume estimates. One of the benefits of chaining is that, for each aggregate, the growth rates of chain price indexes and IPDs derived from chain volume estimates are generally more alike than the previously published fixed-weighted price indexes and IPDs derived from constant price estimates.

Implicit price deflators

10.40 An implicit price deflator (IPD) is an index obtained by dividing a current price value by its corresponding volume estimate. Thus implicit price deflators are derived measures (hence the term 'implicit') and are not normally the direct measures of price change by which current price estimates are converted to estimates at constant prices. The formula for an IPD derived from annual, annually reweighted chain Laspeyres volume measures in year *t* is:

$$IPD_t = \frac{\sum Q_t \, P_t}{L_t^{CV}}$$

Where

Q_t = quantities in year t

P_t = prices in year t

L_t^{CV} = chain Laspeyres volume measure at period t

10.41 When calculated from the major national accounting aggregates, such as gross national expenditure, IPDs relate to a broader range of goods and services in the economy than that represented by any of the individual consumer and producer price indexes published by the ABS.

10.42 Implicit price deflators provide an estimate of 'pure' price change between a year (the base year) and a period in the following year, and use the quantity weights of this latter period. For quarterly IPDs in the latest year, the pure price change is from the year two years earlier. Because the weights change from period to period, implicit price deflators do not compare the price of a constant basket of goods and services between any two periods except when comparing a period with its base period. Therefore, a change in an IPD between any two periods, neither of which is the base period, represents a combination of the effects of actual price changes between the two periods and the effects of relative changes between those periods in the underlying quantity weights, or physical composition, of the aggregate from which the deflator is derived. It is possible for changes in the physical composition of the relevant aggregate to produce an increase in the IPD between two non-base periods when all component prices have decreased or, conversely, a decrease in the deflator when all component prices have increased. While these may be extreme cases, from time to time significant aberrations do occur in practice, e.g. when a major purchase of a capital good is made by the private sector from the public sector, the IPD for public gross fixed capital formation can be negative.

10.43 IPDs calculated from the quarterly national accounting aggregates may be particularly affected by changes in the physical composition of those aggregates. Much of the quarter-to-quarter change in the physical composition of aggregates is seasonal. Therefore, an IPD derived from seasonally adjusted quarterly data is normally a more reliable indicator of 'pure' price change than one calculated from unadjusted data. However, seasonally adjusting the series may not completely eliminate the impact of seasonal changes on the derived IPDs.

Implicit price deflators
continued

10.44 The limitations outlined in the preceding paragraphs mean that the movement in an individual IPD between two quarters should not be taken as a measure of price change in isolation from other relevant information that is available. For instance, the change in an IPD between two periods should be considered in the context of movements of the IPD around the periods in question. This is particularly important with respect to changes from one quarter to the next.

10.45 Annual movements in IPDs derived from the annually reweighted chain volume estimates are much more reliable indicators of price change than the quarterly movements, because they do not suffer from the effects of compositional change and are measures of pure price change. However, if quarterly measures of pure price change are required it is better to use the chain price indexes (see paragraphs 10.47 to 10.49).

10.46 IPDs are subject to revision because of revisions in the relevant current price and/or chain volume estimates, including changes to seasonally adjusted estimates resulting from seasonal reanalysis. In particular, quarterly estimates as first published are sometimes revised substantially when firmer data become available.

Chain price indexes

10.47 The chain price indexes published in the national accounts are annually reweighted chain Laspeyres price indexes and are analogous to chain volume estimates. They comprise the deflators used to derive the volume estimates, weighted together in the same way and at the same level of detail as the chain volume estimates. In those cases where quantity revaluation is used to derive volume estimates the IPD is used in constructing the chain price indexes. However, these IPDs are calculated at such a detailed level that for all intents the published national accounts chain price indexes can be considered as measures of pure price change.

10.48 Chain price indexes are not the only price indexes published by the ABS that measure pure price change. The consumer price index and all the producer and international trade price indexes also do this. However, the chain price indexes have some useful features that these other price indexes do not share at present. First, they encompass the whole of the economy, and second, they are frequently reweighted.

10.49 The detailed price components of the chain price indexes are drawn from ABS producer, international trade, wage cost and consumer price indexes, as well as various sources outside the ABS. This reflects the fact that national accounts aggregates and their associated chain price indexes have a broader scope than related ABS fixed-weighted price indexes, and for some items they adopt different conceptual treatments. As a result of these differences and the fact that they are chained, the chain price indexes differ from related fixed-weighted price indexes published by the ABS. A more detailed comparison of the fixed-weighted equivalents of the Consumer Price Index (CPI), Import Price Index (IPI) and Export Price Index (EPI) is given below.

The chain price index for household final consumption expenditure (HFCE) compared with the CPI

10.50 Movements in the chain price index for HFCE are generally very close to movements in the CPI due to the fact that most parts of HFCE are deflated by components of the CPI. However, differences do occur between the two price indexes in some quarters. Some of the more important reasons for these differences are:

- The CPI is reweighted every four or five years, whereas the chain price index is reweighted every year.
- The chain price index uses a range of price indexes, apart from CPI component series, including producer price indexes, wage cost indexes, stock exchange indexes, and public sector deflators relating to education and hospital expenditure.
- HFCE is broader in scope and relates to expenditure by all Australian resident households and private non-profit institutions serving households whereas the CPI relates to expenditure carried out in Australian resident households of the eight capital cities of the States and Territories.
- The national accounts concept and treatment of HFCE differs from household consumer expenditure as measured by the CPI. Some of the more significant differences are mentioned below, while further details can be found in Chapter 14, and in *The Australian Consumer Price Index: Concepts, Sources and Methods* (Cat. no. 6461.0).
  - HFCE excludes expenditure by persons on the purchase and maintenance of dwellings, but imputes rental payments for owner-occupied dwellings. The CPI represents home ownership costs by actual rents, net house purchase (new dwellings excluding land plus alterations and additions), property rates and charges, house repairs and maintenance and house insurance.
  - Included in HFCE are several items not covered by the CPI. Major goods and services affected are expenditure on gambling and a range of financial services, such as bank charges (both direct and indirect), the administrative costs of life insurance offices and superannuation funds, and share brokering commissions.
  - Expenditure on food and drinks in cafes, restaurants and clubs is included in the HFCE category Hotels, cafes and restaurants, while these expenditures are included in Food in the CPI.

10.51 The conceptual and coverage differences mentioned above, together with the different base periods of the chain price index and the CPI, result in different weights being used in each index when measuring similar components. Some examples are given below in respect of the June quarter 1998:

The chain price index for household final consumption expenditure (HFCE) compared with the CPI
continued

Item	CPI weight (per cent) (as per the 13th series of the CPI)	Chain price index weight (per cent)
Food	19.2	12.2
Private motoring	13.2	10.0
Rent	5.8	17.9
Cigarettes and tobacco	3.1	1.9
Alcoholic drinks	5.1	1.2
Health	3.8	3.8
Recreation and culture	5.8	11.6

The chain price index for exports and imports of goods and services compared with the EPI and IPI

10.52 Both the EPI and the IPI published by the ABS have displayed different price movements from their counterpart national accounts chain price indexes over time. The major reasons for these differences are as follows:

- The EPI and IPI were reweighted relatively infrequently (at 5 yearly or longer intervals until the September quarter 2000, when they became annually reweighted and chained), whereas the chain price index is reweighted annually from 1985–86.
- The chain price indexes in the national accounts cover goods and services, while both the EPI and IPI only cover goods.
- Both chain price indexes are formed by weighting price indexes for services and component IPDs for goods. The goods IPDs are derived at the division level of the Standard International Trade Classification (SITC) and comprise 109 import categories and 66 export categories. The IPDs at the division level for exports are derived from volume estimates formed by quantity revaluing a significant proportion of exports and then deflating the remainder at the division level using appropriate price indexes. The use of IPDs in the construction of the chain price indexes is a weakness, but it is substantially ameliorated by the detailed level at which they are weighted together.

CHAPTER 11 OVERVIEW OF THE SOURCES AND METHODS

INTRODUCTION

11.1 The Australian System of National Accounts (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. Chapters 12 to 28 provide substantial detail on the sources and methods used to compile the various components of the national accounts.

INPUT-OUTPUT TABLES

11.2 Input-output tables provide a comprehensive picture of the supply and use of goods and services in the economy and the incomes generated from production. Conceptually, compilation of the GDP account is fully integrated with the compilation of the I-O tables.

11.3 In Chapter 9 a distinction was drawn between supply and use (S-U) tables and analytical (symmetric) input-output tables. 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 analytical I-O tables are compiled as the second stage of this process at the time the S-U tables for a particular year are deemed to be final.

11.4 The industrial classification used for the 1994–95 I-O tables is based on the 1993 edition of the *Australian and New Zealand Standard Industrial Classification (ANZSIC)*. However, in some respects it departs from the usual application of ANZSIC. For I-O tables it is desirable that an industry corresponds as closely as possible to the production of products primary to that industry. Although some I-O industries have a one-to-one relationship with ANZSIC classes, it is not practicable to have an I-O industry for each ANZSIC class. For further details of the *Australian Input-Output Industrial Classification (IOIC)* and the *Australian Input-Output Product Classification (IOPC)* see Chapter 12 and Appendix 1.

11.5 In the I-O tables, industrial output is calculated on an individual industry basis. Generally the output of industries can be defined as the production of goods and services for use as inputs into industries, exports or into final demand. Data for estimating an individual industry's output are obtained from a variety of sources. The main data sources for estimating individual industries' outputs are ABS economic collections such as the Economic Activity Survey, the Services Industry Survey and the Agricultural Survey. Other sources of data include income tax data (provided by the Australian Taxation Office), public accounts, annual reports and other economic collections.

11.6 *Primary inputs* consist of compensation of employees, gross operating surplus plus gross mixed income, taxes on products (net), other taxes on production (net), complementary imports and competing imports. The main data sources for estimating compensation of employees are the Survey of Employment and Earnings and the Labour Force Survey. Each component of compensation of employees is estimated in aggregate for the whole economy, then apportioned to the 107 industries in the I-O tables.

11.7 Gross operating surplus plus gross mixed income of industries is the residual obtained by subtracting from the value of output: all intermediate inputs; taxes on production (net); and compensation of employees. The gross operating surplus of the producers of government services is defined to be equal to the producer's consumption of fixed capital.

11.8 Accurate data for total other taxes on production (net) are available, but there is little information on their distribution by industry. They are mainly allocated using ABS economic collections and public finance information, and sometimes the nature of the tax itself determines its allocation.

11.9 *Imports* represent the value of goods and services purchased from foreign residents. The imports of goods, which are based on international merchandise trade statistics, are adjusted in accordance with balance of payments concepts of scope, coverage, timing and valuation.

11.10 *Intermediate inputs* into an industry consist of goods and services used in the process of production. Under the Australian input-output methodology, in any particular year some flows will be estimated by reference to basic data sources and included in the intermediate usage matrix as modifications. Other flows will be estimated using the RAS procedure[1]. The Manufacturing Survey, Economic Activity Survey, Department of Defence Annual Reports and ABS government finance data are sources from which modifications are made to input structures. However, more than 25 per cent of the intermediate inputs to all industries are derived from basic data.

11.11 Various sources are used for the expenditure categories of household final consumption expenditure, government final consumption expenditure, gross fixed capital formation and changes in inventories; statistics relating to exports are obtained from international merchandise trade and balance of payments statistics.

11.12 Statistics relating to *employment* are obtained from the ABS Labour Force Survey.

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1 A detailed discussion of the estimation of intermediate inputs using the Australian input-output methodology is provided in the ABS Occasional Paper: The RAS Method for Compiling Input-Output Tables: ABS Experience.

DERIVING ANNUAL BENCHMARKS AND QUARTERLY ESTIMATES FROM SUPPLY AND USE TABLES

11.13 The S-U tables provide annual benchmarks for all aggregates included in the gross domestic product account from 1994–95 for current price estimates and from 1995–96 for chain volume estimates up until the year prior to the latest complete financial year. For each financial year three editions of supply and use tables are compiled in current prices and in the prices of the previous year as more complete information becomes available for their construction (see Chapter 12). Current price and chain volume estimates, therefore, are also revised progressively in line with the revisions to the S-U tables.

11.14 Initial quarterly current price and chain volume estimates are benchmarked to the annual S-U tables using an 'optimal' benchmarking procedure. This procedure seeks to minimise amendments to the quarterly growth rates while ensuring that quarterly estimates sum to their annual counterparts. This procedure is explained in more detail in Chapter 10. The quarterly current price and chain volume components of final consumption expenditure and gross fixed capital formation are derived at the State level using a bottom-up approach. The initial quarterly current price State estimates are adjusted on a pro rata basis to agree with the benchmarked national data. The State volume estimates are then derived from the adjusted current price data. In the case of gross fixed capital formation, the volume estimates are subject to an additional adjustment to ensure consistency with the benchmarked national chain volume estimates.

11.15 Estimates for the latest financial year are obtained by aggregating the quarterly estimates. The quarterly estimates are moved forward from the latest annual benchmarks according to movements in quarterly indicator series. In some cases these series are the same as those used in constructing annual S-U tables. In most cases the quarterly indicators are closely related, but some only provide a general indication of movements in the aggregate being estimated.

11.16 Unlike their current price counterparts, seasonally adjusted chain volume estimates are benchmarked to the annual estimates. This is done because seasonal adjustment is conducted on unchained (and hence unbenchmarked) data, and there is a need to benchmark quarterly chain volume estimates linked on a quarter to annual chain volume estimates. See Chapter 10 for further details.

11.17 While quarterly current price estimates are compiled using the income and expenditure approaches, chain volume estimates are compiled using the expenditure and production approaches. The expenditure-based estimates are generally derived by deflating their current price counterparts using prices indexes. The major exception is exports of goods—see Chapter 18 for further details.

11.18 The production view of GDP in chain volume terms shows gross value added at basic prices by industry and the item 'taxes less subsidies on products'. With the exception of agriculture, output or input indicators are used for all industries to extrapolate and interpolate annual benchmarks in order to derive quarterly chain volume estimates.

FINAL CONSUMPTION EXPENDITURE

11.19 SNA93 provides for three main *expenditure aggregates* for final consumption expenditure: household final consumption expenditure; final consumption expenditure of NPISHs; and government final consumption expenditure. Separate estimates of final consumption expenditure of NPISHs are not currently compiled by the ABS. Their expenditure is included instead with that of households.

11.20 *Household final consumption expenditure* (HFCE) consists of current expenditure by persons, and the output of goods and services by non-profit institutions serving households. HFCE is a large aggregate covering a wide range of goods and services. The *Classification of Individual Consumption by Purpose (COICOP)* is an international standard for dissecting HFCE by purpose or function. In the Australian national accounts HFCE is aligned, as far as possible, with COICOP. The Retail Censuses have in the past provided the main data for compiling benchmark estimates for most of the goods components of HFCE. The census data are adjusted for retail sales which are out of scope of the censuses. Also, where appropriate, an estimate of business purchases is deducted.

11.21 There is a need to validate and confront the estimates that make up the national accounts by benchmarking to annual supply and use tables because many independent data sources are used to compile the estimates of household final consumption expenditure. In many cases these collections are undertaken infrequently, so that in some periods extrapolations may be necessary, using less than complete data. The ABS confronts these estimates with those produced in compiling annual supply and use tables.

11.22 Current price and volume estimates of HFCE, expressed in the prices of the previous year, are derived for each COICOP commodity group for each State. The elemental volume estimates are aggregated to form chain volume estimates for the published national and State statistics. For almost all commodities the volume estimates are derived by revaluing their current price counterparts with the corresponding commodity-specific and State-specific component of *Consumer Price Index* (Cat. no. 6401.0).

11.23 *Government final consumption expenditure* (GFCE) is mainly the output of producers of general government goods and services, less revenue from any sales or charges in respect of that output. Annual and quarterly estimates for Commonwealth and State governments are based on public account ledgers, budget papers, Auditors'-General Reports and supplementary Commonwealth and State departmental documents. For local government, estimates are based on annual and quarterly ABS questionnaires of local government authorities, as well as data from the Commonwealth Grants Commission and the Department of Local Government.

FINAL CONSUMPTION EXPENDITURE *continued*

11.24 As there are no market prices for government service output, derivation of volume estimates involves current prices being revalued using price indexes relating to the inputs to the general government sector. The major input into this sector is labour, and therefore public sector/industry (State and national) wage rate indexes from *Wage Cost Index* (Cat. no. 6345.0) are used extensively in deriving the appropriate price indexes.

GROSS CAPITAL FORMATION

11.25 In SNA93, *gross capital formation* comprises three categories of investment:

- gross fixed capital formation;
- changes in inventories; and
- acquisitions less disposals of valuables.

11.26 Gross fixed capital formation consists of assets which are either tangible or intangible, and have come into existence as outputs from processes of production, and are used repeatedly over periods of time longer than one year. Some examples of fixed assets include dwellings, other buildings and structures, machinery and equipment, and computer software. Estimates of private gross fixed capital formation are based on a variety of sources including building statistics, an ABS survey of private capital formation, and Taxation Statistics, while estimates of public gross fixed capital formation are based on the accounts of public authorities and additional information supplied by these bodies.

11.27 *Changes in inventories* are defined to include changes in:

- goods for sale, whether from own production or purchased for resale;
- work in progress; and
- raw materials and stores.

11.28 The value of inventories recorded in business accounts at the end of each period is known as the book value. For national accounting purposes, the physical changes in inventories during a period should be valued at the prices prevailing at the time that inventory changes actually occur. In the ASNA a special adjustment, the inventory valuation adjustment (IVA), is made to remove the effect of capital gains or losses which can occur on the book value of inventories.

11.29 The quarterly current price estimates of changes in inventories are derived using the quarterly indicator series and a pro rata additive adjustment is made to ensure that the quarterly estimates agree with the annual benchmarks from the S-U tables. For other than benchmark years, annual estimates for changes in inventories are obtained by aggregating the quarterly estimates.

GROSS CAPITAL FORMATION
continued

11.30 The quarterly Survey of Inventories, Sales and Services (SISS) provides the basic data for estimating changes in private non-farm inventories. Changes in farm inventories are mainly derived from information obtained from the Agricultural Survey and export statistics, and from relevant marketing authorities. Changes in public authority inventories are derived from information supplied from the authorities concerned, ABS government finance statistics, Auditors'-General Reports, Commonwealth and State government budget papers, and the Department of Finance and Administration Quarterly Ledgers.

11.31 *Acquisitions less disposals of valuables* consist of precious stones and metals, works of art, antiques, jewellery, etc. Estimates of GFCF for 'valuables' are not included in the Australian national accounts because of a lack of adequate data.

CAPITAL STOCK AND CONSUMPTION OF FIXED CAPITAL

11.32 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 capital stock* is obtained by valuing each asset in use at the current price of a new asset of the same type, regardless of its age;
- *net (or economic) capital stock* is the net present value of the future capital services provided by an asset; and
- *productive capital stock* is derived as the written down value of each asset in accordance with its decline in efficiency due to age.

11.33 Given the real productive capital stock and a suitable discount rate we can determine the real 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. This function defines how the net capital stock of an asset declines as it ages.

11.34 Two flow concepts are relevant to capital stocks: consumption of fixed capital and capital services.

- *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 between the real economic value of the asset at the beginning and at the end of the period.
- *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 sum of COFC during the period and a rate of return on the net capital stock of assets.

CAPITAL STOCK AND CONSUMPTION OF FIXED CAPITAL *continued*

11.35 COFC 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 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.

11.36 Australia uses the perpetual inventory method (PIM) to derive *capital stock* estimates. In any particular period investment in capital assets is added to stocks and retirements of assets are deducted. To apply the PIM a number of data sets are required, some of which involve significant assumptions because of the lack of complete information. These include:

- the average length of asset lives;
- the extent to which assets are retired before, on or after the average asset life for that asset—the asset life distribution;
- 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); and
- price indexes for the entire time span of gross fixed capital formation (GFCF).

11.37 There is a lack of information about how the efficiency of assets decline over their lives. The ABS has generally adopted the use of hyperbolic functions to describe the rate of decline in efficiency. With these functions the efficiency of the asset declines by small amounts at first and the rate of decline increases as it ages. An average age-efficiency function is derived for each asset by weighting together, as per the asset life distribution, all the age-efficiency functions corresponding to the different possible asset lives.

11.38 *Age-price functions* are calculated using average age-efficiency functions and a real discount rate. For most asset types it is assumed that the asset life is constant over time so the age efficiency, and age-price functions do not vary over time in these cases. However, important exceptions are road vehicles, computer equipment and software which are assumed to have asset lives that change over time.

EXPORTS AND IMPORTS

11.39 In any given period, some of the output of an economy may be acquired by non-residents, and similarly, some of the goods and services acquired by residents may have been produced by non-residents. These transactions are classified as exports and imports of goods and services, respectively.

11.40 The exports and imports of goods and services shown in the national accounts are identical to those provided in the balance of payments statistics. 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 used to compile statistics for exports and imports.

EXPORTS AND IMPORTS
continued

11.41 The main data source for exports and imports of goods is the ABS's International Trade Statistics (ITS), which are derived from information reported to the Australian Customs Service. The annual estimates are obtained by summing the quarterly estimates.

11.42 The principal sources of information on exports and imports of transport services are the International Trade Statistics and the Survey of International Trade in Services (SITS), with adjustments derived from other sources. *Travel services* are derived using three data models, while the principal source for *other services* is again the SITS.

11.43 The chain volume estimates of imports of goods and services are derived almost exclusively by deflating current price values using detailed price indexes. All but two of the goods components are deflated using price indexes derived from those underlying the price indexes published in *Import Price Index, Australia* (Cat. no. 6414.0). The chain volume estimates of exports of goods and services are derived by quantity revaluation for most primary commodities and by deflation for manufactured goods and for services.

COMPENSATION OF EMPLOYEES

11.44 The value of entitlements earned by employees from their employers for services rendered includes wages and salaries received by employees in cash and in kind (e.g. provision of food, accommodation or motor vehicles), and employers' social contributions such as superannuation contributions and workers' compensation premiums.

11.45 *Annual estimates* for wages and salaries for Australia, and by State, are an aggregation of the quarterly estimates. Industry estimates for Australia are derived annually from the balanced S-U tables, except for the latest financial year, for which estimates are obtained by extrapolation using movements based on the quarterly data sources.

11.46 *Quarterly estimates* (from the September quarter 1983) are based on the Survey of Employment and Earnings (SEE) which collects employment and earnings data from a sample of both private employers and public sector units. The SEE is an employer-based survey. It provides data on the number of jobs held and on earnings derived from jobs held. However, due to certain deficiencies, the SEE tends to understate total employment and earnings.

11.47 The Labour Force Survey (LFS) on the other hand, is based on a sample of dwellings, and provides information on the number of people in jobs. The LFS provides a more complete estimate of the number of wage and salary earners than the SEE does. As a result, the employment and earnings estimates obtained from the SEE are used in conjunction with the LFS estimates (and various other sources) to obtain an estimate of total wages and salaries on a quarterly basis.

GROSS OPERATING SURPLUS AND GROSS MIXED INCOME

11.48 Both gross operating surplus (GOS) and gross mixed income (GMI) measure the surplus accruing from processes of production before deducting any explicit or implicit interest charges, land rent or other property incomes payable on the financial assets, land or other tangible non-produced assets required to carry on the production. Gross operating surplus and gross mixed income are defined as gross value added minus compensation of employees, minus taxes on production and imports payable, plus subsidies receivable. Gross operating surplus 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, GOS represents only consumption of fixed capital. Gross mixed income represents the gross income derived by unincorporated enterprises.

11.49 Estimates of GOS and GMI are compiled by institutional sector, namely: private non-financial corporations; public non-financial corporations; unincorporated enterprises; dwellings owned by persons; general government; and financial corporations.

11.50 From 1994–95 the S-U tables provide annual benchmark estimates for GOS and GMI in total for all types of institutional units.

11.51 Benchmark estimates for *private non-financial corporations* are derived by subtracting the estimates of GOS plus GMI for all other types of institutional units from total GOS plus GMI. To provide quarterly estimates of the GOS of private non-financial corporations, the annual benchmarks are allocated to quarters using data from the publication *Company Profits, Australia* (Cat. no. 5651.0).

11.52 Estimates for public non-financial corporations are compiled from annual financial statements included with the annual reports of the corporations, and Auditors'-General Reports. A quarterly survey of large public non-financial corporations is conducted to obtain revenue and expenditure data.

11.53 Estimates of the gross mixed income of unincorporated enterprises are derived separately for the farm and non-farm sectors. Annual gross mixed income by industry for non-farm *unincorporated enterprises* is derived from Taxation Statistics supplemented by information from the ABS and other sources. Gross mixed income of farm unincorporated enterprises is derived as the difference between total farm GOS and the GOS of private farm corporations and quasi corporations. Total farm GOS is derived using a production approach; it is measured as gross value of agricultural production less the costs incurred. The gross value of agricultural production is estimated from data collected in the ABS annual Agricultural Commodity Survey together with additional data from various marketing organisations, wholesalers, brokers and auctioneers. Before costs are deducted, an allowance is also made for subsidies not included in the gross value of agricultural production (e.g. drought relief), and a production valuation adjustment (PVA) is deducted. The PVA is required for wheat and wool because the

gross value of agricultural production is based on realised future sales prices, which may be different from average current period prices (the basis required for the national accounts). The PVA is calculated directly using quantity data and the difference between average current period prices and the prices underlying the calculation of the gross value of production. Costs are obtained from a variety of sources, including the ABS Agricultural Finance Survey (AFS), the Australian Bureau of Agricultural and Resource Economics (ABARE) publication *Australian Commodities Forecasts and Issues and the Agriculture, Australia* (Cat. no. 7113.0). Quarterly estimates of the GMI of non-farm and farm unincorporated enterprises are obtained by moving the annual benchmarks using various indicators or on trend.

11.54 GOS for *ownership of dwellings* is derived as gross rent less operating expenses (but before the deduction of consumption of fixed capital). An 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. The sources and methods used to estimate gross rents of tenanted dwellings and to impute gross rents to owner-occupied dwellings are described in Chapter 14. Operating expenses related to dwelling GOS include municipal rates, building insurance, repairs and maintenance, consumption of financial services and the commissions of real estate agents charged for the management of rental properties. General municipal rates, and 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 for total dwelling rent) and movements in appropriate component price indexes from the CPI. Estimates for building insurance are derived from annual data published by the Australian Prudential Regulation Authority (APRA). The item 'consumption of financial services' comprises the imputed service charge component of interest payable on loans used to finance the purchase of dwellings by persons. Real estate agents' management fees are derived using data from the ABS 1980 Housing Occupancy Survey and agents' fee schedules, and extrapolated using estimates of gross rents of tenanted dwellings as an indicator. Municipal rates are allocated to quarters according to information about receipts of local government rates. The remaining expenses are estimated by linear trend. GOS related to the ownership of dwellings by the public sector and non-financial corporations are deducted to give GOS dwellings owned by persons. The quarterly estimate of GOS for dwellings owned by private and public corporations is allocated to quarters on trend.

GROSS OPERATING SURPLUS AND GROSS MIXED INCOME *continued*

11.55 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 (i.e. an assumption is made in calculating the value of gross output that the net operating surplus is zero).

11.56 For *financial corporations and quasi corporations* the approach used to measure GOS is to include an imputed service charge in addition to any actual charges made by these corporations, plus gross non-land rent and service income, plus a capitalised software adjustment, minus expenses and imputed financial service charges.

11.57 Estimates of GOS for *financial intermediaries* are derived in aggregate. Various ABS and other data sources are used to prepare the estimates of GOS for financial intermediaries. The principal data sources are the monthly *Reserve Bank of Australia Bulletin*, ABS annual Economic Activity Survey returns for banks, annual reports of individual financial enterprises, State Auditors'-General Reports and monthly, quarterly and annual ABS surveys conducted to produce statistics on the operations of various types of financial intermediaries.

11.58 Separate estimates are compiled for the GOS of *non-life insurance corporations* (based on information about premiums and claims), and of *life insurance corporations* and *pension funds* (based on administration expenses and explicit charges). These estimates of GOS are mainly sourced from data contained in the reports of APRA, State Auditors'-General, State insurance offices and the ABS surveys of labour costs and superannuation funds.

11.59 Linear trend interpolation and extrapolation are used to obtain quarterly estimates for the GOS of financial corporations as at present there are no ABS surveys which provide direct quarterly estimates. It is expected that in future the ABS will be able to use quarterly data compiled by APRA from its new and redeveloped collections from financial corporations to prepare quarterly estimates of GOS for this sector.

TAXES LESS SUBSIDIES ON PRODUCTION AND IMPORTS

11.60 Taxes on production and imports 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
- other taxes on production such as taxes on ownership or use of land, buildings, or other assets used in production, or on the labour employed, or on labour costs.

TAXES LESS SUBSIDIES ON PRODUCTION AND IMPORTS *continued*

11.61 *Annual estimates* for Commonwealth and State general government taxes and subsidies are derived from administrative sources such as Commonwealth and State budget papers and Auditors'-General reports, Commonwealth Department of Finance and Administration ledgers and supplementary departmental documents. For local government, the information is obtained by means of a joint ABS/Commonwealth Grants Commission annual return, which is collected from each local government authority.

11.62 *Quarterly* data for local government rates are collected from a sample survey of local government authorities. Information about Commonwealth and State general government production taxes and subsidies is extracted 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.

PROPERTY INCOME AND SECONDARY INCOME FLOWS

11.63 Income flows may be divided into primary income and secondary income. Primary income comprises compensation of employees (see above), gross operating surplus and gross mixed income (see above), taxes less subsidies on production and imports (see above), and property income. Secondary income flows relate entirely to current transfers of income from one institutional sector to another (other than those included in primary income) and include current taxes on income, wealth, etc., social contributions and benefits, and miscellaneous current transfers.

11.64 *Property income* represents transfers of income resulting from the use of financial assets, and of tangible non-produced assets such as land and sub-soil assets. It includes interest, dividends, imputed property income, rent on natural assets and reinvested earnings on direct foreign investment. Annual estimates of property income are derived by constructing matrices of the various flows of property income between the various sectors and subsectors of the economy. Sufficient quarterly data are not available to enable a detailed matrix approach to be used for the compilation of quarterly estimates. Quarterly estimates of property income received and paid by general government are obtained from the ABS government finance system. Property income receivable from and payable to non-residents is obtained from balance of payments statistics. The principal data source used to compile quarterly estimates of household property income is the monthly *Reserve Bank of Australia Bulletin*.

11.65 *Current taxes on income, wealth etc*. comprise two components: income taxes; and other current taxes on income, wealth etc. 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 tax payable by corporations is derived using net tax assessed on companies from Taxation Statistics. Income tax payable by individuals, partnerships and trusts is obtained from the Commonwealth Department of Finance and Administration ledgers.

Quarterly estimates are derived from Commonwealth Department of Finance and Administration ledgers. 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. All other licences are treated as purchases of services rendered by general government to households. Revenue for licences collected from households is included in current taxes on income, wealth, etc., while licence revenue from businesses is included in taxes on production and imports. Quarterly estimates are derived from the Commonwealth Department of Finance and Administration and State government monthly and quarterly statements of receipts and expenditure.

11.66 *Social contributions and social benefits* are current transfers receivable by households to provide for needs that arise from certain events or circumstances such as sickness, unemployment, education, etc. There are two kinds of social benefits: social insurance benefits; and social assistance benefits. Social insurance benefits, in the Australian context, only relates to workers' compensation. Social assistance benefits include old age pensions, unemployment benefits, etc. *Annual* estimates of workers' compensation are compiled using data from the annual ABS Economic Activity Survey, the periodic Major Labour Costs Surveys and from APRA. Social assistance benefits are obtained from the ABS government finance system. *Quarterly* estimates of workers' compensation are compiled by allocating annual estimates for the private and public sectors separately using wages and salaries as the indicator. Quarterly estimates of social assistance benefits are compiled using information from administrative sources such as the Commonwealth Department of Finance and Administration Quarterly Ledgers, and State government monthly and quarterly statements of receipts and expenditure.

11.67 *Net non-life insurance premiums* are defined as non-life insurance premiums less the non-life insurance service charge. *Annual* estimates for net premiums and claims for non-life insurance (excluding health insurance funds) are compiled using data published in the APRA publication *Selected Statistics on the General Insurance Industry*. *Annual* estimates for net non-life insurance premiums and non-life insurance claims for health insurance funds are compiled using data published in the Private Health Insurance Administration Council publication *Operations of the Registered Health Benefits Organisations*. *Quarterly* estimates of net non-life insurance premiums and non-life insurance claims are compiled by applying a linear trend formula to the annual estimates.

PROPERTY INCOME AND SECONDARY INCOME FLOWS *continued*

11.68 *Miscellaneous current transfers* include the items: current transfers to non-profit institutions; current transfers from the Commonwealth Government to State and local government; current international cooperation'; and other current transfers. Annual estimates of current international cooperation are obtained from Commonwealth Department of Finance and Administration ledgers. Estimates of miscellaneous current transfers between general government and the other institutional sectors are obtained from ABS government finance statistics. Other current transfers to and from non-residents are obtained directly from balance of payments statistics. Quarterly estimates of miscellaneous current transfers between general government and the other institutional sectors are compiled using information from administrative sources such as the Commonwealth Department of Finance and Administration quarterly ledgers, and State government monthly and quarterly statements of receipts and expenditure. Current transfers to and from non-residents are obtained directly from balance of payments statistics.

11.69 *Social transfers* in kind are individual goods and services provided to individual households by general government units. The goods and services may be produced by the government units or purchased by them. Estimates of social transfers in kind are obtained from ABS government finance statistics.

11.70 For the purposes of deriving the *imputed flows relating to general government unfunded superannuation schemes,* 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. A model is used to calculate these estimates (details of this model are provided in Appendix A to Chapter 22). The model is applied to annual data up to 1997–98. With the introduction of accrual accounting in the general government sectors for the Commonwealth and the States and Territories, direct estimates for these flows are now being made for most jurisdictions. Quarterly estimates for the imputed employer contributions and imputed property income flows are derived using appropriate indicators.

CAPITAL TRANSFERS

11.71 A capital transfer is one in which:

- the ownership of an asset (other than cash or inventories) is transferred from one unit to another; or
- cash is transferred to enable the recipient to acquire another asset; or
- the funds realised by the disposal of an asset are transferred.

11.72 Examples of capital transfers include contributions to local government by real estate developers towards the cost of construction of roads, building and equipment grants, and payments to States and Territories to meet capital expenditure.

CAPITAL TRANSFERS
continued

11.73 *Annual* estimates of all capital transfers between general government and the other institutional sectors are obtained from ABS government finance statistics. For Commonwealth and State general government, data are extracted from administrative sources such as Commonwealth and State budget papers and Auditors'-General Reports. A joint ABS/Commonwealth Grants Commission annual return provides the details required for local government.

11.74 Capital transfers to and from non-residents are obtained directly from balance of payments statistics, as are Commonwealth government foreign aid transfers of a capital nature. 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).

11.75 On a *quarterly* basis, only estimates of capital transfers to and from non-residents are published. These estimates are taken directly from balance of payments statistics compiled using the same sources as for the annual estimates.

VALUE ADDED BY INDUSTRY

11.76 The current price estimates of gross value added by industry are only produced annually. For the years from 1994–95 these estimates have been derived in an input-output framework and are in balance with the expenditure estimates.

11.77 Quarterly chain volume measures of gross value added by industry 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. The specific statistical procedures used to calculate chain volume measures are outlined in Chapter 10.

11.78 Quarterly chain volume indicators of gross value added are derived using three different methods. 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. In a few cases the output indicator is just a single output statistic, but in most cases it is a composite of several output statistics. Another method is *double deflation*; it requires that, before chaining, volume measures of intermediate input are subtracted from volume measures of output, both valued in the prices of the previous year. This method is used for Agriculture. The third method, the *input indicator method*, involves extrapolation using a measure of labour input such as hours worked, and is used mainly to obtain estimates for general government dominated industries such as Government administration and defence, Education and Health and community services.

FINANCIAL ACCOUNTS

11.79 The financial accounts record information about transactions in financial assets and liabilities.

11.80 In theory, data for compilation of the financial accounts and the financial components of the balance sheet could be obtained from both parties to every financial transaction and position, i.e. a creditor's view and a debtor's view. Advantage is taken of the fact that financial transactions of numerous transactors, such as households, are mostly channelled through a much smaller number of other units, such as banks and other financial institutions. Therefore, for example, the financial transactions and position of households can be determined by obtaining information from other institutions that engage in financial transactions with households.

11.81 Most of the sources of data used in the compilation of the financial components of the national accounts are derived from statistical surveys conducted by the ABS. Of particular importance are the 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 sources, particularly in estimating for certain types of financial corporations and in deriving valuation adjustments.

11.82 Compilation methods for stocks (levels) involve gathering balance sheet information from various sources and selecting the most reliable estimates. As noted above, a choice is often possible because different data sources provide alternative or counterpart measures of the same item. For example, most borrowing by State-owned non-financial corporations will be reported by the State central borrowing authorities or Treasuries as assets and by the non-financial corporations themselves as liabilities. The data will not generally agree because the ABS does not survey all State-owned non-financial corporations. In this case, the data from the central borrowing authorities and Treasuries are therefore used to estimate both the asset and liability aspects of these borrowings. Financial transactions on the other hand are derived by taking the difference between closing and opening levels of balance sheet items, and eliminating the component of change which is caused by valuation effects such as exchange rate movements and price fluctuations.

BALANCE SHEETS

11.83 A balance sheet is a statement, drawn up at a particular point in time, of the values of assets owned by, and the financial claims against, the owner of those assets.

11.84 *Valuation* of the assets in the balance sheet should be on the basis of current observable market prices, as this is the basis on which decisions by economic agents are made. In the absence of observable market prices, current prices are approximated for balance sheet purposes in two ways:

- market prices may be approximated by accumulating and revaluing acquisitions less disposals of the asset in question over its lifetime; or
- market prices may also be approximated by the present, or discounted, value of future economic benefits expected from any given asset.

BALANCE SHEETS *continued*

11.85 Market and market proxy prices are available for a wide range of assets, and such prices have been used in calculating estimates of the value of land and livestock in the ASNA balance sheets. In addition, estimates of the value of financial assets and liabilities (from *Australian National Accounts: Financial Accounts* (Cat. no. 5232.0)) and direct foreign investment (from *Balance of Payments and International Investment Position, Australia* (Cat. no. 5302.0)) are based on market values. Subsoil and timber assets are valued using the net present value approach.

11.86 The main data sources used for the *sectoral* breakdown of the national balance sheet include published and unpublished ABS data, Taxation Statistics, and State and Territory Valuers'-General departments. Data for the *components of the balance sheet*, which consists of fixed produced assets, inventories, financial assets and liabilities, livestock, land, subsoil assets and standing timber, are primarily derived using the PIM (Chapter 16) and data drawn from; the Survey of Inventories, Sales and Services; the Agricultural Census; Valuers' General; the Australian Geological Survey Organisation; ABARE; and the State forestry departments.

PRODUCTIVITY MEASURES

11.87 The ABS produces annual indexes of labour, capital and multifactor productivity for the market sector, and annual labour productivity indexes (gross value added per hour worked) for each industry division within the market sector.

11.88 Measures of real output per unit of labour are conventionally referred to as measures of *labour productivity*. The measure of output used by the ABS in its estimates of productivity is gross value added in chain volume terms. This is defined as output less intermediate inputs. The measure of input used is hours worked.

11.89 Measures of real output per unit of capital are conventionally referred to as measures of *capital productivity*. The measure of output used by the ABS in its estimates of capital productivity is the flow of capital services. They are calculated by weighting chain volume measures of the productive capital stock of different asset types together by their rental prices. Rental prices can be regarded as the 'wages' of capital.

11.90 Labour and capital productivity measures only attribute to one factor of production—labour or capital—the changes in efficiency attributable to all factors of production. This limitation has given rise to the development of a more comprehensive measure, *multifactor productivity* (MFP). MFP takes account of several factor inputs at the same time, and is largely a measure of the effects of technical progress, improvements in the work force, improvements in management practices, economies of scale, and so on.

11.91 *Australian National Accounts: State Accounts* (Cat. no. 5220.0) contains annual estimates of gross state product and its principal expenditure and income components. *Australian National Accounts: Quarterly State Details* (Cat. no. 5206.0.40.001) contains quarterly estimates of State final demand and its components, international trade for imports and exports of goods, and compensation of employees by State and Territory.

11.92 The *annual current price estimates of gross state product* (GSP) are produced by summing the income components of gross state product. State by industry estimates of compensation of employees (COE) are derived from essentially the same data sources as those used for the national estimates. Estimates of *gross operating surplus* (GOS) plus *gross mixed income* (GMI) by State and industry, are generally derived by allocating the national industry estimates of GOS plus GMI by State. *Taxes and subsidies on production and imports* relating to the State and local general government sector are allocated directly to the State in which they are collected or paid. Taxes and subsidies on production and imports relating to the Commonwealth Government are allocated to States at a detailed level using the most appropriate indicators available for each tax or subsidy.

11.93 *Quarterly current price estimates of COE*, which are prepared for all industries combined, are derived as the sum of State estimates of the components described for the national estimates in Chapter 19. The method used to compile COE by quarter is also described there. *Household final consumption expenditure* by State is calculated by dissecting the Australian estimate for each of the components described in Chapter 14. *Gross fixed capital formation* for the private sector is largely derived from the same sources which are used for the Australian estimates, although a higher degree of approximation is required. Allocation of capital expenditure for general government is based on certain assumptions as well as population and employment data.

11.94 It is not possible to derive estimates of GSP using the expenditure approach because of a lack of data for some components, most importantly interstate trade in goods and services. Likewise, not all the data required to support the production approach are currently available. The only approach for which data are available is the income approach, but this approach does not lend itself to volume estimation. It is not possible to satisfactorily deflate such incomes because they do not comprise readily identifiable price and quantity elements. While it is not possible to construct chain volume estimates of GSP by deriving chain volume estimates of the various expenditure components at a detailed level, it is possible to deflate the total current price income based estimate of GSP if a suitable aggregate deflator is constructed. This aggregate deflator is derived by using all the available expenditure components of GSP to derive current price and chain volume estimates and then calculating the quotient. See Chapter 28 for details.

CHAPTER 12 INPUT-OUTPUT TABLES

INTRODUCTION

12.1 Chapter 9 provides an extensive description of input-output and its importance within the overall ASNA. This chapter describes how input-output tables are put together in Australia and how they relate to the rest of the accounts.

12.2 Various tables are included under the broad heading of input-output tables. Essentially each of these tables provides further 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 input-output tables provide detailed dissections of that activity and, by showing intermediate transactions, they enhance the description of productive activity within an economy.

THE I-O APPROACH TO COMPILING THE NATIONAL ACCOUNTS

12.3 The input-output tables have been and continue to be an integral part of the Australian System of National Accounts. Input-output tables present a comprehensive picture of the supply and use of goods and services (referred to collectively as 'products') in the economy and the incomes generated from production. They also 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.

12.4 SNA93 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. It 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.

12.5 Commencing with 1994–95, the annual GDP account has been compiled using the commodity flow method (the so called 'I-O approach to compiling the GDP account', or simply the 'I-O approach'). In other words, the compilation of the GDP account is fully integrated with the compilation of the I-O tables.

12.6 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 produced; 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.

THE I-O APPROACH TO COMPILING THE NATIONAL ACCOUNTS *continued*

12.7 Chapter 9 provides an extensive description of the full input-output framework for compiling a set of national accounts. In that chapter a distinction is drawn between supply and use (S-U) tables and analytical, or symmetrical, input-output tables. The usefulness of S-U tables as a statistical tool is emphasised. The strategy adopted by the ABS in relation to the compilation of input-output 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 process of benchmarking the GDP account to balanced S-U tables is referred to as the I-O approach. The analytic input-output tables are compiled as the second stage of this process when the S-U tables for a particular year are deemed to be final.

12.8 The I-O approach to compiling the GDP account allows for the annual and quarterly current price GDP accounts to be benchmarked to balanced S-U tables. 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 rebenchmarked GDP account is published first in the June quarter issues of the ASNA. This strategy means that the quarterly accounts will never be projected more than seven quarters from a balanced set of annual accounts. Apart from the most recent year (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.

12.9 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	end of yr t + 40 months

12.10 Thus, for example, in respect of reference year 1999–2000, the first preliminary S-U tables will be completed at the end of June 2001. The second preliminary version of these tables will be completed in June 2002, and the final tables in June 2003. The 1999–2000 input-output tables would then be published in October 2003.

12.11 The major implication of the 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 (paragraph 12.8 above).

THE I-O APPROACH TO COMPILING THE NATIONAL ACCOUNTS *continued*

12.12 Supply and use tables are compiled in prices of the previous year as well as in current prices. 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. The preferred method for estimating the real 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.

SOURCES AND METHODS

Classification of industries and products

12.13 The industrial classification used for the 1994–95 and subsequent input-output tables, the *1994–95 Australian Input-Output Industrial Classification (IOIC)*, is based on the 1993 edition of the *Australian and New Zealand Standard Industrial Classification (ANZSIC)*. However, in some respects, it departs from the usual application of that classification. ANZSIC is mostly applied to establishment units, and this is the starting point for most of the input-output industries. However, for input-output 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 establishments 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 such production is primary; this process is called 'redefinition of production'.

12.14 The major redefinitions which are made in the process of compiling the input-output tables for Australia are as follows. Trading activity of miners and manufacturers is redefined to wholesale or retail trade, and any significant manufacturing activity of wholesalers is redefined to appropriate manufacturing industries. The input-output industries: mechanical repairs and other repairs have no counterpart in ANZSIC. They are formed by redefinition of the repair activity undertaken by wholesalers and retailers. Significant capital work on own account, where not primary to the industry of the establishment undertaking the activity, is redefined to construction or an appropriate manufacturing industry. The imputed component of the ownership of dwellings industry is specified in the 1993 ANZSIC as being part of the residential property operators industry (ANZSIC Class 7711). In addition, there are some areas of the economy—for example construction and agriculture—where the nature of available data or other considerations may preclude a strict adherence to ANZSIC sectoring. In these areas, the input-output industries are formed by the redefinition of products from an ANZSIC sector.

Classification of industries and products *continued*

12.15 Some of the input-output industries correspond to single ANZSIC classes, but it is not practicable to have an input-output industry for each ANZSIC class. The aim is to provide both a balanced picture of the structure of the economy and comparability between the latest input-output tables and earlier ones. Details of the Australian *Input-Output Product Classification (IOPC)*, and concordances between the items in the classification and data source items of production, imports and exports, are available on floppy disk.

Industrial output

12.16 Generally, the output of industries is defined as the production of goods and services for use as inputs into industries or as final demand. Own account production and transportation not separately invoiced is not shown separately, but rather is included indistinguishably with the rest of producers' output. The actual estimation procedures used for each industry are given below.

12.17 In agriculture, the value of output is the ex-farm or local value, which is estimated by valuing quantities of the various products. (The data are obtained mainly from the annual Agricultural Survey and the Agricultural Finance Survey.) The value of containers, such as bags and cases, is added where appropriate to the local value of output to bring the treatment of rural industries into line with that of manufacturing industries. In services to agriculture, hunting and trapping, the value of output is estimated by reference to measures of the usage by industries of, and in final demand for, products primary to services to agriculture, hunting and trapping. The output of forestry and logging includes the value of forest products, and government and private current expenditure on management of forest resources. The information comes mainly from Australian Bureau of Agricultural and Resource Economics (ABARE) collections and partly from the reports of public authorities. The output of commercial fishing is the local value of the fish obtained from ABARE collections.

12.18 In mining, manufacturing, electricity supply and gas supply, the estimates of output are based on information obtained from ABS economic statistics collections.

12.19 The starting point for these estimates of output is the sum of the following items derived from data obtained from the economic statistics collections: sales and transfers-out of goods produced on the premises; changes in inventories of finished goods and work-in-progress; margin on merchanted goods; capital work on own account; and other specified operating income items. The initial estimates for some industries have a product mixture which is not satisfactory for input-output purposes, and in these cases some secondary output and associated inputs are shifted to the industry to which the output is primary.

12.20 In particular, it is important not to mix processing activity with trading activity because trading activity is treated in a special way in input-output tables. Accordingly, the trading activity of mining, manufacturing and electricity establishments is redefined, partly to wholesale trade and partly to retail trade. In doing this it is assumed that the mining and manufacturing industries, in undertaking this wholesale and retail activity, use the same inputs in the same proportions as the Wholesale trade and Retail trade industries. It is also assumed that the percentage margin earned on these goods by manufacturers is the same as that earned by wholesalers or retailers dealing mainly in similar goods. For the purpose of redefinition, it is also necessary to estimate the inputs into gross margin earned by manufacturers. These estimates are based on the input structure of wholesalers or retailers.

12.21 Apart from trading activity, it is necessary to examine other components of the output of the mining, manufacturing, electricity supply and gas supply industries. Capital work on own account is the subject of special investigations undertaken to determine whether or not the activity is typically primary to the industry reporting it. In those cases where capital work on own account is large, where the activity is primary to another industry and where it is possible to identify the relevant inputs, it is desirable to redefine the capital work on own account to the industry to which it is primary. In other cases, where the capital work on own account is not primary to the producing industry, it is treated as output secondary to that industry.

12.22 Information on a range of other specified operating income items is also collected in economic statistics questionnaires. Investigations are undertaken for industries where revenue from manufacturing on commission is significant. Where commission work is carried out for an establishment coded to a non-manufacturing ANZSIC class, estimates are made of the value of the products produced and materials used, and these are transferred to the industry to which the products are primary (usually the industry of the establishment carrying out the commission work). The commission is absorbed by inclusion in the value of production. Where the commission work is carried out for establishments coded to a manufacturing ANZSIC class, the value of products produced is recorded in the output of the industry commissioning the work. It is assumed that the commissioning establishment does not further process the goods. The commission is recorded as an intra-industry flow.

12.23 Data on rent and leasing revenue are collected in economic statistics questionnaires, and investigations have been conducted into the components of this revenue. Where the value of rent and leasing revenue is large, it is redefined. In other cases it is treated as secondary production of the industry receiving it. Payments for rent and leasing are treated as purchases of products by the industry making the payment.

12.24 The estimates of the output and input for the services to mining industry are derived using information obtained from the ABS surveys of mineral and petroleum exploration and the Economic Activity Survey.

12.25 For tables published for reference years prior to 1983–84, the major component of the output estimate for the services to mining industry consisted of the revenue of establishments that provided services to the mining industries. The main service provided is drilling (on a contract or fee basis). For the tables in respect of reference year 1983–84 and subsequent years, the estimate of output includes the value of exploration activity undertaken on own account. This refers to the exploration undertaken by establishments as a service to their parent enterprises and for which these establishments receive no revenue. The output value attributed to this activity is the current cost of providing the service, i.e. wages paid plus cost of goods and services used by these establishments. For the tables from 1993–94, the estimate of output includes mine operations on a contract or fee basis. Services to mining such as assaying and geological surveying are excluded from this industry and are included in the scientific research, technical and computer services industry.

12.26 With effect from 1994–95, output in the form of exploration activity is shown as gross fixed capital formation. Prior to the 1994–95 tables this output was mainly recorded as intermediate usage by the mining industry. Under this treatment the GOS recorded for the mining industry is now substantially higher as exploration expenditure is not treated as intermediate consumption.

12.27 The output of the residential building construction industry represents the value of work done on new dwellings and the value of repairs to dwellings. The output of other construction comprises new construction other than on dwellings and all repairs to non-dwelling buildings and structures carried out by the construction industry. The estimates of the output of the residential building construction and other construction industries are based on information from a number of different sources, including ABS building statistics, surveys of construction and engineering construction, income tax data, public accounts, annual reports of public enterprises, data from other economic statistics collections (for own-account construction and sales of construction materials), and the Household Expenditure Survey (for expenditure on construction and construction materials).

12.28 The output of wholesale trade and retail trade is defined as gross margin on goods traded (difference between sales and cost of goods sold) plus commission and other non-margin receipts. The value of goods handled is not included in the output of wholesalers and retailers, who are considered to sell only distribution services. Estimates for the output of the wholesale trade and retail trade industries are based on information from ABS collections of these industries. Estimates of output for these industries includes wholesale and retail activity redefined from other industries such as manufacturing. The activities of wholesalers and retailers other than distribution, such as manufacturing, repairing and leasing, are either redefined to an appropriate industry or are shown separately as non-margin output. These non-distribution activities are treated as follows: manufacturing activity of wholesalers is redefined to an appropriate manufacturing industry; repair activity of wholesalers and retailers is redefined to one of the industries: mechanical repairs or other repairs as appropriate; rent and leasing revenue, and service revenue, are treated as non-margin output of wholesale trade or retail trade; and takeaway food selling is treated as non-margin output of retail trade.

12.29 After the separation of non-distribution activities, the gross margin on goods traded is estimated in total and by product. The margin on individual products is estimated using the results of periodic ABS collections of the wholesale trade and retail trade industries, the results of supplementary investigations, and the difference between estimates of the supply of products at basic prices and usage at purchasers' prices.

12.30 In the accommodation, cafes and restaurants industry, restaurants, cafes, licensed hotels and licensed clubs are covered by the economic statistics collections, and considerable data from these surveys are available regarding the output of this part of the industry. However, some adjustments are made for input-output purposes. First, the output of the industry includes a margin on sales of goods (e.g. cigarettes) that is treated in the same way as retail margin. Second, takings from meals served in cafes, hotels, etc. and from the consumption of beverages associated with a meal is treated as meal preparation and presentation, a service activity of this industry that forms part of its output. This output is not treated as a margin. In tables prior to 1994–95 the consumption of beverages in association with a meal was treated as a margin activity.

12.31 In the transport and storage industries the output is defined as revenue derived from the activity of carrying goods and passengers for hire and reward, the storage of goods, and the provision of other transport services. As with wholesale and retail trade, it is necessary to distinguish between the carriage of goods (freight), which forms part of the margin, and other services provided by transport industries, which do not (e.g. furniture removal and passenger transport). Total rail, pipeline, air and water transport revenues are extracted from the reports of the enterprises concerned as far as possible. The estimate of output of the road transport industry is built up from information about items such as the supply of goods potentially carried, primary inputs, motor vehicle running costs, miscellaneous other costs, revenue for services provided, and data collected in ABS surveys. The estimates of transport margin by product are approximate because of the limited information about the types of goods carried by each mode of transport.

12.32 Estimates of output of the communication services industry are based on the published accounts of enterprises in the industry and unpublished information made available by these enterprises. The output of the industry consists of postal, telegraph, telephone and telex revenue; commission earned on agency services (such as conduct of savings bank agencies); technical services provided to national broadcasting and television stations; international communication services and telecommunications satellites; and the coastal radio services.

12.33 In the finance industries, the definition of the output of banks and similar financial enterprises (other than insurance companies) differs from that of other enterprises. The activities of these enterprises are financed to a large extent, or even predominantly, by the excess of the interest they receive over the interest they pay out. If they were treated similarly to trading enterprises (i.e. if their output were taken as equal to their explicit charges for services provided) their output would not be sufficient to cover all their costs and to produce a positive operating surplus. Because of this characteristic of financial enterprises it is necessary to adopt a treatment different from that for non-financial enterprises. The convention adopted in Australian input-output tables from 1968–69 is that part of the interest received by financial enterprises is considered to be a service charge and, therefore, part of their output. Users of these services are deemed to be paying a service fee on funds both lent to and borrowed from these financial institutions. Since the 1977–78 tables these charges related to financial intermediation services indirectly measured (FISIM) have been allocated to final uses and intermediate uses on the basis of various sets of information mainly relating to interest flows. FISIM is discussed in greater detail in Chapter 20. The tables from 1994–95 on also include estimates of imports and exports of these services. In addition to FISIM charges on the output of financial enterprises includes explicit charges made to customers.

12.34 Output of those financial enterprises that provide insurance services is also defined in a manner that is different to all other sectors. For non-life insurance enterprises (such as motor vehicle and property insurers) no explicit charge is made for their services. A service charge is therefore imputed, for national accounts purposes, as direct premiums earned plus inward reinsurance minus outward reinsurance and associated statutory charges plus premium supplements minus expected claims. Premium supplements refer to property income (e.g. interest and dividends) earned on: (a) that part of premiums paid in advance and, (b) claims incurred but not yet paid (as a consequence of delays in finalising payments from the time claims were first lodged). Expected claims are imputed as a centred five year moving averages of actual claims incurred. The value of the service charges (output) for life insurance and pension funds are derived as the explicit charges made by non-mutual insurance enterprises for the services they provide. In the case of mutual funds output is deemed to be equal to the sum of the administrative costs incurred by the fund (including labour costs). This approach, in respect of mutual funds, implies that no net operating surplus accrues to the insurance enterprise itself but rather the surplus is deemed to accrue to policy holders. Refer also to Chapter 20.

12.35 Information on the output of banks, non-bank financial institutions, insurance companies and superannuation funds is available from ABS collections, the Australian Prudential Regulation Authority (previously from the Insurance and Superannuation Commission) and the Reserve Bank. There is very little information for some enterprises in the finance and insurance industries, and the output estimates for these are largely built up from the input side by adding together estimates of primary inputs and of the usage of products primary to these industries.

12.36 Estimates of the output and input for property and business services industries are derived mainly using information from ABS Service Industries Surveys supplemented by information from the Economic Activity Survey. For those activities primary to industries not covered by the surveys, estimates of output and input are derived from taxation statistics. The output of the ownership of dwellings industry is gross rent of dwellings (actual rent paid in the case of tenanted dwellings and an imputed rent for owner-occupied dwellings). Benchmark information for these items is obtained from the Census of Population and Housing, and various indicators are used to extrapolate and interpolate benchmark information.

12.37 The output of the government administration and defence industries is the production of goods and services by general government units coded to these industries. The output is conventionally valued as the sum of intermediate inputs (including the charge for financial intermediation services indirectly measured); compensation of employees; general government consumption of fixed capital; and taxes on production. Ideally, the estimates would be on an accrual basis for consistency with estimates for other industries. Prior to 1998–99, the data required for this purpose were not available as most estimates based on public accounts were on a cash basis rather than an accrual basis. However, from 1998–99 onwards these estimates are on an accrual basis. The output of the defence industry prior to the 1994–95 tables was defined such that expenditures on items that would be considered capital formation in other industries were treated as current expenditures, thereby contributing to the value of defence industry output. From 1994–95 capital-type items acquired by the defence industry are treated as capital formation except where the items are for strictly military purposes. While the acquisition of these assets no longer contributes to the value of the defence industry's output, the consumption of fixed capital on these assets still does.

12.38 The output of the education; health services; community services; libraries, museums and the arts; and other services industries consists of three components. The first of these is production of goods and services by general government units, which represents the sum of intermediate inputs; compensation of employees; consumption of fixed capital and taxes on production (net). The second is production by trading enterprises, such as doctors in private practice and private garbage disposal contractors, which is valued as the revenue from services provided. The estimates for this component are derived using either data on inputs (e.g. compensation of employees) or business income from Taxation Statistics (Australian Taxation Office). The last is production by the producers of private non-profit services to households, such as schools and churches, which is measured as the sum of intermediate inputs; compensation of employees; and taxes on production (net). By convention, there is no operating surplus or mixed income. The estimates for this component are based mainly on public accounts.

12.39 The remaining industries, namely motion picture, radio and television services; sport, gambling and recreational services; and personal services, cover a range of services rendered to persons and, to a lesser extent, to businesses. For the motion picture, radio and television services and sport, gambling and recreational services industries, estimates are made using information from economic surveys where this is available (e.g. for motion picture theatres). Data of reasonable quality are available from public accounts and published reports for public broadcasting and television stations. Total revenues are available for commercial broadcasting and television from the report of the Australian Broadcasting Control Board. For the remainder of this industry, the output estimates are built up from primary inputs, estimates of other costs and demand for the services provided.

Industrial output *continued*

12.40 For the personal services industry, the economic surveys provide information about the output of men's and women's hairdressers, and laundry and dry cleaning establishments. For the remainder of the industry, output is estimated from the input side and from measures of the level of demand for the services provided.

Primary inputs

12.41 Primary inputs consist of compensation of employees, gross operating surplus and gross mixed income, taxes on products (net), other taxes on production (net), complementary imports and (in direct allocation tables) competing imports.

12.42 Estimates of the compensation of employees for each industry are the end result of a complex estimation process. Compensation of employees consists of wages and salaries paid in cash, wages and salaries paid in kind and employers' social contributions. Each component is first estimated in aggregate for the economy as a whole, then each aggregate is apportioned to the 107 industries. Compensation of employees for each individual industry is derived by summing these separate components. For wages and salaries paid in cash, an aggregate is derived by applying average earnings from the Survey of Employment and Earnings to an estimate of total employee-status jobs from the Labour Force Survey. This aggregate is allocated to each input-output industry in accordance with proportions established through analysis of the ABS economic statistics collections. The second component of compensation of employees is wages and salaries in kind. This item refers to the situation where employees are remunerated through provision of goods or services rather than in cash. Estimates of the aggregate value of this form of remuneration are obtained by applying expansion factors to Fringe Benefits Tax payments. The third component in compensation of employees is employers' social contributions. These consist of workers' compensation insurance premiums paid by employers and employers' actual and imputed contribution to superannuation funds and separately constituted long-service leave funds.

12.43 The gross operating surplus and gross mixed income of industries is the residual obtained by subtracting from the value of output all intermediate inputs; taxes on production (net); and compensation of employees.

12.44 The gross operating surplus of the producers of government services is defined to be equal to the producers' consumption of fixed capital. This is the value, at current replacement cost, 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.

Primary inputs *continued*

12.45 Reliable estimates of total other taxes on production (net) are available, but there is little information on their distribution by industry. Fringe benefits tax and payroll tax are separately reported in the ABS economic surveys and this information is used to allocate these taxes. Motor vehicle taxes are first apportioned between persons and businesses, using Government Finance information, and the business part is allocated to industries in proportion to motor vehicle running expenses. Other taxes on production in this group are allocated to industries on various bases. Sometimes the nature of the tax determines the allocation, e.g. road maintenance tax is allocated entirely to the road transport industry, and rates on residential property are allocated to the ownership of dwellings industry. In some other cases, information concerning taxes on production (net) is obtained in the course of investigating industry inputs.

Imports

12.46 Imports represent the value of goods and services purchased from foreign residents. Imports of goods are based on international merchandise trade statistics, but with balance of payments scope, coverage, timing and valuation adjustments. For details of these balance of payments adjustments, see *Balance of Payments and International Investment Position, Australia: Concepts, Sources and Methods* (Cat. no. 5331.0). Imports of services are also based on balance of payments sources.

12.47 Although the estimates of imports of individual products are recorded on a c.i.f. basis, aggregate imports are shown on a f.o.b. basis to maintain consistency with the total for imports of goods and services shown in the balance of payments. This is achieved by netting off the value of the freight provided by Australian carriers from the estimates of imports c.i.f.

Intermediate inputs

12.48 Intermediate inputs into an industry consist of goods and services used in the process of production. A detailed discussion of the estimation of intermediate inputs using the Australian input-output methodology is provided in the ABS Occasional Paper: *The RAS Method for Compiling Input-Output Tables: ABS Experience*, which outlines the residual allocation system (RAS). In essence, RAS is a procedure which requires the successive scaling of column and then row elements by successively prorating to column totals and row totals until the matrix elements are fully reconciled with both row and column control totals. The number of iterations required will depend on the consistency of the initial data matrix with the row and column control totals. The accuracy of the final matrix derived will depend on the suitability of the initial matrix as an indicator.

12.49 Ideally, information on the value of the goods and services which comprise the intermediate inputs of industries would be collected from businesses each year. However, it is difficult to obtain this information directly from business, and the ABS also considers that collecting this type of data every year is an unacceptable impost on those businesses responding to ABS surveys. Therefore, the ABS only collects information on intermediate inputs for a selected portion of the intermediate use quadrant in respect of each year. The RAS procedure is used to enable this new information to be combined with the intermediate inputs matrix projected forward from the previous table in order to estimate the intermediate inputs matrix for the current year. The incorporation of this new information is referred to as applying 'modifications' to the intermediate usage matrix.

12.50 Selected data from the Manufacturing Survey and the Economic Activity Survey are the basis of extensive modifications to the input structures of the manufacturing industries. The input structure of the defence industry is substantially derived from data in the Defence Annual Report and ABS Government Finance data. In addition, the input structures of the electricity and gas supply industries have been modified from basic data, and the input structures for the mining industries have been modified to account for the use of contract mining services. In most years approximately 25 per cent of the intermediate inputs (other than the FISIM charge) to all industries are derived from basic data.

12.51 The charge for FISIM is allocated to using industries on the basis of information on interest paid and interest received by the various industries. These interest data are compiled from a number of sources including Government Finance data and the ABS economic statistics collections.

12.52 Rows relating to the margin item: taxes on products (net); and to the following margin products: wholesale trade; retail trade; accommodation, cafes and restaurants; road transport; rail transport; pipeline transport; water transport; air and space transport; port handling; and marine insurance, are wholly modified by margin estimates derived in the compilation of the eleven margin tables. The column totals of the margin tables, which show the total usage of each margin by each industry, are then incorporated as values in the eleven margins rows.

Final demand

12.53 Household final consumption expenditure consists of current expenditure (including household expenditure on motor vehicles and durables) by persons, and the output of goods and services by non-profit institutions serving households. Estimates of household final consumption expenditure are based largely on retail sales, supply of consumer goods, outputs of services, information about the revenues of public enterprises and general government, and estimates of the actual and imputed rent from dwellings. Estimates by industry of origin are based partly on the product dissection of retail sales provided by retail activity surveys and partly on data about the supply of consumer goods. Household Expenditure Survey results are used mainly to validate estimates of household final consumption expenditure provided by ABS economic statistics collections, especially for products produced by industries other than agriculture, mining and manufacturing.

12.54 Government final consumption expenditure is mainly the output of producers of general government goods and services less revenue from any sales, or charges in respect of that output. The classification of government final consumption expenditure by product differs from a classification by purpose in that, for example, departmental administration is classified to public administration in the product classification and not to the activity administered (e.g. education). Estimates are based on public accounts.

12.55 Private gross fixed capital formation includes outlays on, additions to and replacement of fixed assets of all kinds by private enterprises. Commencing with the 1994–95 tables, fixed assets include various intangible assets such as computer software; artistic originals; and mineral exploration. Furthermore, the natural growth of breeding livestock is treated, for the first time, as capital formation in the 1994–95 tables. Purchases of dwellings by persons and all capital expenditure by private non-profit organisations serving households are included. Expenditure on major repairs which significantly extend the life of assets is included. Estimates of private gross fixed capital formation are based on a variety of sources including building statistics, a regular ABS survey of private capital formation and Taxation Statistics. To some extent both the total estimates for this category and the product estimates depend on the output of goods and services not absorbed by other final demand categories or intermediate usage. Taxes on production (net) applying to transactions in land and fixed capital are included in private gross fixed capital formation. These include: stamp duties on all capital transfers; the cost of conveyancing services, real estate services and surveying services associated with the purchase or sale of dwellings; agricultural or pastoral properties, and other non-dwelling real estate; and miscellaneous government charges.

Final demand *continued*

12.56 Public gross fixed capital formation includes all outlays on, additions to and replacement of fixed assets by public corporations and by general government. However, defence expenditure on assets with strictly military use is treated as current and included in government final consumption expenditure. Estimates of gross fixed capital formation of public corporations and general government are based on the accounts of public authorities and additional information supplied by these bodies. The classification of gross fixed capital formation of public corporations and general government relies on information on the nature of the assets purchased and goods and services produced from the assets.

12.57 Changes in inventories are calculated by deducting an adjustment for holding gains from the change in book value of inventories. The major inventory-owning industries are covered by the economic collections, and information for other industries is available from Taxation Statistics, the accounts of public authorities and a regular ABS survey of private inventory holdings. However, these sources do not provide a sufficient dissection of inventories by product. The allocation of the change in book value of inventories to industry of origin is made by inference (but not by automatic apportionment) from the categories of goods sold by wholesalers and retailers and the finished goods of producers, and from the categories of material inputs. Estimating the adjustment for holding gains by product group requires similar inferences about the level of inventories, assumptions about valuation practices, and reliance on partial information about product prices.

12.58 Statistics relating to exports are obtained from the international merchandise trade and balance of payments statistics. The category includes re-exports, for which the corresponding import is included in the row for competing imports. The product detail provided in international merchandise trade and balance of payments statistics is used to allocate exports to input-output products.

Employment

12.59 The employment estimates that accompany the ABS's input-output tables are measured on a full-time equivalent basis, i.e. the full-time equivalent of part-time employment is added to full-time employment. For these estimates the full-time equivalent of part-time employment is assumed to be 50 per cent of the part-time employment. Employment estimates have been derived from the ABS Labour Force Survey. The annual estimates are the average of data for the middle month of each of the four quarters of the reference year.

CHAPTER 13 DERIVING ANNUAL BENCHMARKS AND QUARTERLY ESTIMATES FROM SUPPLY AND USE TABLES

INTRODUCTION

13.1 This chapter discusses the methods used to derive annual benchmarks and quarterly estimates for relevant aggregates in the gross domestic product account in current price and chain volume terms.

CURRENT PRICE ESTIMATES

13.2 The supply and use (S-U) tables provide annual benchmarks for the major current price aggregates included in the gross domestic product account for all years from 1994–95 (except for the latest financial year, for which S-U tables are not available). S-U tables were first compiled in respect of 1994–95. As explained in Chapter 12, three versions of the S-U tables are compiled in respect of each financial year. Consequently, the annual current price estimates are revised progressively for three years, as more complete information becomes available to construct the successive S-U tables for a particular financial year.

13.3 Initial quarterly current price estimates are benchmarked to the annual estimates from the supply-use tables using an 'optimal' benchmarking procedure which seeks to minimise amendments to the quarterly growth rates of the initial quarterly estimates while ensuring that the final quarterly estimates sum to their annual counterparts. The benchmarking procedure used was developed by Pierre Cholette of Statistics Canada. It is used to benchmark the quarterly flow data to the annual data. Let c_t and b_t respectively denote the unbenchmarked and benchmarked current price estimates for quarters t. The estimates of b_t minimise the sum of $(c_t / b_t - c_{t-1} / b_{t-1})^2$ over a moving five year span subject to the summing to the annual current price estimate. The values of the b_ts in the central year are used, except at the ends of the series.

13.4 Estimates for the latest financial year are obtained by aggregation of the quarterly estimates, which are obtained in turn by extrapolation 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 gross fixed capital formation 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 Company Profits Survey), while in a few cases the indicators used provide only a general indication of movements in the aggregate being estimated.

13.5 In conjunction with the implementation of the I-O approach in respect of 1994–95, some improvements to estimation methods were applied to the gross domestic product account estimates for earlier years. These improvements related mainly to compensation of employees (where refinements were implemented to the measure of wage and salary earners receiving pay in the reference period, which is obtained from the monthly Labour Force Survey), as well as to gross fixed capital formation on private dwellings and to other buildings and structures (where improved estimates were incorporated for various building services, such as those provided by architects, quantity surveyors and structural engineers).

13.6 The annual S-U tables also provided benchmark estimates for industry gross value added by ANZSIC Division from 1994–95. As these estimates were significantly different to the previous (i.e. SNA68-based) estimates for some industries, the new SNA93-based industry estimates were backcast to 1989–90. The changes due to differences between SNA68 and SNA93 were directly estimated by industry, but the changes resulting from benchmarking to balanced S-U tables were extrapolated using previously estimated movements prior to 1994–95.

Quarterly estimation methods

13.7 Four general methods are used to compile quarterly current price national accounts estimates for Australia:

- direct sources;
- indicators (pro rata);
- indicators (using 'benchmark'); and
- trend interpolation with or without specific annual forecasts.

A brief description of each is provided below.

Quarterly estimation methods—direct sources

13.8 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. The new dwellings component of private gross fixed capital formation on dwellings is an example of where this method is applied.

Quarterly estimation methods—indicators (pro rata)

13.9 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. The quality of estimates compiled using this method will depend on how closely the indicator series relates to the required national accounts aggregate. If the indicator series is very closely related to the national accounts aggregate that it is being used to estimate, this method will provide good quality quarterly estimates. However, if the correlation between the indicator series and the national accounts aggregate is volatile, this method would provide relatively poor quarterly national accounts estimates. 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. This problem is reduced by using the 'benchmark' procedure discussed in the paragraph 13.10. 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.

Quarterly estimation methods—indicators (using 'benchmark')

13.10 This method of deriving quarterly estimates involves applying a mathematical technique that maintains the movements in the indicator series for all quarters as far as possible, but with the constraint that the sum of the quarterly estimates for each financial year must equal the corresponding annual benchmark estimate. In effect, instead of all the differences in the relationship between the annualised indicator series and the benchmark series being reflected in the September quarter, as would occur if the simple pro rata method was used, the differences are distributed across all quarters (see also paragraph 13.3 above).

Quarterly estimation methods—trend interpolation with or without specific annual forecasts

13.11 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. A mathematical representation of the trend interpolation procedure is provided in Appendix 6. 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.

CHAIN VOLUME ESTIMATES

13.12 The annual S-U tables are compiled in both current prices and in the prices of the previous year. The latter, which are compiled from 1995–96, are used to benchmark the quarterly chain volume estimates of the gross domestic product account in exactly the same way as their current price counterparts. Estimates for the latest financial year are obtained by aggregating the quarterly estimates which are derived by extrapolation from the latest annual benchmarks, in just the same way as the current price estimates.

13.13 While quarterly current price estimates are compiled for the income and expenditure 'views' of gross domestic product, the chain volume estimates are compiled for the expenditure and production views. In general, the chain volume expenditure estimates are derived by revaluing their counterpart current price estimates using price indexes. The major exception is exports of goods, for which most of the aggregate is derived by revaluing quantity data—see Chapter 18 for further details.

13.14 The production view of gross domestic product comprises an industry dissection of gross value added at basic prices and the item 'taxes less subsidies on products'. The preferred method for deriving volume estimates of valued added is by subtracting a volume estimate of intermediate input from a volume estimate of output. This method is employed in the annual S-U tables, but is employed for only one industry, agriculture, in deriving quarterly chain volume estimates. For all the other industries, output or input indicators are used to extrapolate and interpolate the annual benchmark estimates.

13.15 Most of the output and input indicators used in deriving the quarterly chain volume estimates of gross value added are available quarterly. In most cases, the source of these data differs from that used in compiling the annual S-U tables. The major exception is the construction industry, for which the quarterly data for value of work done from the Building Activity Survey, and data from the Engineering Construction Survey, are also used in compiling the annual S-U tables.

13.16 Linear trend interpolation/extrapolation of annual data (without annual forecasts) is only used for fishing; for insurance; and for the general government components of the cultural and recreational services industry and the personal and other services industry.

CHAPTER 14 FINAL CONSUMPTION EXPENDITURE

INTRODUCTION

14.1 Total final consumption expenditure in the economy may be viewed from two perspectives. It may be 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. Alternatively, it may be defined 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. The coverage of the goods and services is the same in both cases.

THE EXPENDITURE AGGREGATES

14.2 The main expenditure aggregates in SNA93 are:

- *Household final consumption expenditure*—this 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*—this consists of expenditure, including imputed expenditure, incurred by resident NPISHs on individual 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*—this 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.

HOUSEHOLD FINAL CONSUMPTION EXPENDITURE

Description

14.3 Household final consumption expenditure (HFCE) measures current expenditure by households and non-profit institutions serving households. HFCE is a large aggregate covering a wide range of goods and services. It is therefore usually desirable to further dissect this item. The SNA93 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 for a breakdown of 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'—for more details see Chapter 15);

Description *continued*

- 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.

14.4 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

Most of these major categories are further split into subcategories.

14.5 In the Australian national accounts 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 will not include an estimate of HFCE on narcotics in COICOP item 02 Alcoholic beverages, tobacco and narcotics, as reliable data on narcotics expenditure are not available. Other items, such as expenditure on COICOP item 09.6 Package holidays, are 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. Also, Australia will not include an explicit estimate of HFCE on prostitution services in COICOP item 12.1 Personal care, as reliable data on such expenditure are not available. The functional categories of HFCE described in this chapter are based on COICOP as modified for Australian circumstances in the Australian national accounts.

Description *continued*

14.6 As noted in paragraph 14.3, the final consumption expenditure of NPISHs is included with that of households in the ASNA. SNA93 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 Environment protection
09 Services n.e.c.

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.

Components of HFCE estimated using the Retail Censuses and Retail Trade Surveys

14.7 The periodic Retail Censuses provide the primary benchmarks for many components of HFCE. The census results are adjusted for sales which are out of scope of the census and, where appropriate, an estimate of business purchases is deducted. The last three censuses were conducted for the years 1979–80, 1985–86 and 1991–92. Some service industries that were included in the 1979–80 census were excluded from subsequent censuses because of the introduction of the Selected Services Industries Surveys that commenced in respect of 1986–87. Other elements included in the benchmarks are: sales by manufacturing, mining, wholesale, electricity and gas establishments, and NPISHs; sales by organisations selling directly to the public; goods withdrawn from stock for own use; self-supplied food; and several other minor items.

Components of HFCE estimated using the Retail Censuses and Retail Trade Surveys *continued*

14.8 The latest Retail Census benchmark is moved forward using data from the monthly Survey of Retail Trade. Until June 1987, quarterly commodity data from the Survey of Retail Trade were available as indicators for these components. These data are no longer available and component estimates for more recent quarters (and years) are derived by applying relationships between industry and commodity sales data from the 1991–92 Retail census to monthly industry data from the Survey of Retail Trade. The change in that survey from June 1988 to collect data on a retail turnover rather than a retail sales basis further complicated the estimation of these components. As a result, the estimates of the individual components for periods after June 1987 are less firmly based than those for earlier periods. The effect of the changes on the estimates of total HFCE is minimal.

Benchmarking to supply and use tables

14.9 By necessity, many independent data sources are used to compile estimates of HFCE. Retail Censuses and Surveys, Service Industries Surveys, Household Expenditure Surveys, and Public Finance statistics, are just a few of the data sources used. In many cases, these collections are undertaken infrequently, so that in some years extrapolations have to be made using less complete data. National accountants also have to transform many of these source data onto a national accounts basis. They also have to make estimates using whatever data are available where no census, survey or similar data are available. By necessity, the national accounts make extensive use of methods based on benchmarks extrapolated forward using other indicator data. In a period of comparatively rapid change, extrapolative methods based on assumptions of fixed relationships become less tenable. In these circumstances there is a need to validate or confront the estimates that make up the national accounts.

14.10 The approach now undertaken by the ABS, for years from 1994–95, is to confront estimates of final demand, including HFCE, with estimates of supply, within supply and use tables. Several improvements to the overall quality of HFCE estimates have resulted from this confrontation process.

Volume estimates of household final consumption expenditure

14.11 Volume estimates of household final consumption expenditure, expressed in the prices of the reference year, are derived for each of the commodity groups described below for each State. These elemental volume estimates are aggregated to form chain volume estimates for the published national and State statistics.

14.12 For most commodities, household final consumption expenditure comprises expenditures in Australia less expenditures by non-residents in Australia plus expenditures by Australian residents overseas. The net value of the first two items is revalued as a single entity. For almost all commodities the volume estimates of this entity are derived by revaluing their current price counterparts with a suitable deflator. In most cases this deflator is the corresponding commodity-specific and State-specific consumer price index (CPI) taken from *Consumer Price Index* (Cat. no. 6401.0).

Volume estimates of household final consumption expenditure *continued*

14.13 For all commodities, expenditures by Australian residents overseas are revalued using a single deflator which comprises the aggregate CPIs (after adjustment by exchange rate conversion factors) of those countries frequently visited by Australian residents, weighted together according to the values of Australian expenditures in those countries.

14.14 The volume estimates of expenditures by non-residents in Australia are precisely offset by corresponding values in exports of services, and the volume estimates of expenditures by Australian residents overseas are precisely offset by corresponding values in imports of services.

01 FOOD AND NON-ALCOHOLIC BEVERAGES

01.1 Food

Description

14.15 This component comprises the following groups of expenditure:

- food and non-alcoholic drinks purchased by households for their own consumption from retail and service outlets, direct sellers and non-profit organisations such as school canteens;
- food withdrawn from the inventories of unincorporated enterprises for consumption by the owner's household;
- food provided to employees as part of compensation of employees (payments in kind); and
- significant items of food produced by the household for its own consumption, such as fruit, vegetables and chicken eggs.

14.16 The value of food consumed by Australian residents in cafes, restaurants, hotels, motels and similar catering establishments is part of HFCE on Hotels, cafes and restaurants (category 11); the value of meals consumed by patients in hospitals and nursing homes is part of HFCE on Health (06.3).

Sources and methods

14.17 The periodic Retail Census provides the primary benchmarks for estimates of food and non-alcoholic drinks purchased by households for their own consumption from retail and service outlets. Other elements included in the benchmark are: sales by manufacturing and wholesale establishments; sales by organisations selling directly to the public; goods withdrawn from inventories for own use; and self-supplied food. The latest benchmark is moved forward using data from the monthly Survey of Retail Trade.

14.18 The value of self-supplied food is based on estimates of the amount of food produced for own consumption from *Home Production of Selected Foodstuffs, Australia* (Cat. no. 7110.0), extrapolated using movements in the retail food series.

Volume estimates

14.19 Current price estimates of purchases of food by Australian residents in Australia are revalued using the relevant component of the CPI.

14.20 Current price estimates of purchases of food by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.21 Chain volume estimates of purchases of food are derived by aggregating the elemental volume components of the above.

02 ALCOHOLIC BEVERAGES AND TOBACCO

02.1 Alcoholic beverages

Description

14.22 The scope of this component is personal outlays on liquor. Included are liquor sales by wine merchants, supermarkets, hotel bottle shops and wineries, and the imputed value of home-produced wine and beer. Liquor which is bought and consumed on licensed premises is part of HFCE on category 11 Hotels, cafes and restaurants.

Sources and methods

14.23 The periodic Retail Census provides the primary benchmarks for expenditure on alcoholic beverages. The census results are adjusted for sales that are out of scope of the census. Results from *Hospitality Industries, Australia* (Cat. no. 8674.0), and *Clubs, Pubs, Taverns and Bars, Australia* (Cat. no. 8687.0) provide additional benchmark data. The latest benchmark is moved forward using data from the monthly Survey of Retail Trade.

Volume estimates

14.24 Current price estimates of purchases of alcohol by Australian residents in Australia are revalued using the relevant component of the CPI.

14.25 Current price estimates of purchases of alcohol by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.26 Chain volume estimates of purchases of alcohol are derived by aggregating the elemental volume components of the above.

02.2 Tobacco

Description

14.27 The scope of this component is all personal outlays on tobacco products.

Sources and methods

14.28 The value of tobacco products consumed is estimated using the formula:

consumption	*equals*	domestic production
	plus	imports
	less	exports
	less	changes in inventories

Sources and methods continued

14.29 Information about the quantity of tobacco produced is obtained from the Australian Customs Service and is based on documents lodged for excise purposes. Imports and exports data are obtained from the International Trade Collection. This quantity information is then adjusted for estimated changes in manufacturers' and distributors' inventories and multiplied by the average purchaser's price per kilogram. The information about prices comes from the CPI.

Volume estimates

14.30 Current price estimates of purchases of cigarettes and tobacco by Australian residents in Australia are revalued using the relevant component of the CPI.

14.31 Current price estimates of purchases of cigarettes and tobacco by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.32 Chain volume estimates of purchases of cigarettes and tobacco are derived by aggregating the elemental volume components of the above.

03 CLOTHING AND FOOTWEAR

Description

14.33 This item includes all personal outlays on new clothing (including sporting clothing) and accessories (such as belts and handbags), clothing materials, and tailoring and dressmaking services (including alterations and repairs); and personal outlays on shoes and boots including most sporting footwear.

Sources and methods

14.34 The periodic Retail Census provides the primary benchmarks for these series. The census results are adjusted for sales that are out of scope of the census. Other elements included in the benchmark are: sales by manufacturing and wholesale establishments and sales by organisations selling directly to the public. The latest benchmark is moved forward using data from the monthly Survey of Retail Trade.

Volume estimates

14.35 Current price estimates of purchases of clothing and footwear by Australian residents in Australia are revalued using the relevant component of the CPI.

14.36 Current price estimates of purchases of clothing and footwear by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.37 Chain volume estimates of purchases of clothing and footwear are derived by aggregating the elemental volume components of the above.

04.1 Actual rentals for housing

Description

14.38 The scope of this component is dwelling rent paid by households to the owners of dwellings.

Sources and methods

14.39 These estimates are produced using the same sources as for the estimates of Imputed rentals for housing (see 04.2 below). The benchmark calculation gives a direct measure of the dwelling rent paid by households to the owners of dwellings. A small deduction is made to allow for bad debts. See 04.2 below on Imputed rentals for housing for information about how these estimates are interpolated and extrapolated.

Volume estimates

14.40 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 aggregate chain volume estimate described in paragraph 14.47

04.2 Imputed rentals for housing

Description

14.41 The scope of this component is the imputed value of housing services accruing to owner-occupiers from their occupation of both their principal residence and any additional residence such as a holiday home.

Sources and methods

14.42 The Census of Population and Housing is used to benchmark these estimates. The census gives the number of owner-occupied and rented dwellings, and information about rents paid for rented dwellings. 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 unfurnished privately rented dwellings in various categories (major urban, other urban, rural; cross-classified by structure of dwelling and number of bedrooms) by the number of owner-occupied dwellings in the same categories.

14.43 Estimates of total dwelling rent (imputed rent of owner-occupiers plus other dwelling rent) 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. 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. Private dwellings include separate houses, duplexes, town houses, flats, including those which are part of a building which 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 in *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 (demolitions,

Sources and methods continued

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 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 that for the latest intercensal period.

14.44 Movements over time in average rents are estimated using a weighted average of price indexes for privately owned dwelling rents and government owned dwelling rents from the CPI.

14.45 Total dwelling rent is estimated quarterly, and the annual estimates are the sum of the quarterly estimates. Separate estimates of the imputed rent of owner-occupiers and other dwelling rent are only produced annually. These are obtained by assuming a constant rate of change in the proportion of dwellings that are owner-occupied between census benchmarks. For the post-census period the rate of change observed for the previous intercensal period is used.

Volume estimates

14.46 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 aggregate chain volume estimate described in paragraph 14.47.

04.1 + 04.2 Actual and imputed rentals for housing

Volume estimates

14.47 Annual volume estimates of actual and imputed rentals for housing are derived by extrapolating the current price value in the reference year with volume estimates of the net capital stock of dwellings published in the *Australian System of National Accounts* (Cat. no. 5204.0). Quarterly estimates of capital stock are derived by interpolating and extrapolating the annual estimates using quarterly volume estimates of private gross fixed capital formation on dwellings and quarterly volume estimates of consumption of fixed capital derived from either the corresponding annual estimates (for interpolations) or the most recent annual estimates (for extrapolations). Initial State allocations are derived by extrapolating the current price estimates in the reference year with estimates of the mean residential population. These initial estimates are then adjusted to ensure they sum to the unchained Australian totals.

04.3 Other services relating to the dwelling

Description

14.48 This item includes payments for services such as refuse collection, sewerage services, and water supply including standing charges and excess water charges.

Sources and methods

14.49 Total expenditure on rates and excess water is available from Auditors'-General Reports. Households' share of this expenditure is estimated using information provided by public authorities.

Volume estimates

14.50 Current price estimates of purchases of services relating to the dwelling are revalued using the relevant component of the CPI.

04.4 Electricity, gas and other fuels

Description

14.51 This item encompasses expenditure by households on energy for domestic heating, cooking, and lighting; that is, purchases of reticulated gas, LPG, electricity, heating oil, kerosene, firewood, briquettes, coal and coke.

Sources and methods

14.52 Quarterly estimates of household expenditure on gas and associated services are estimated using sales data provided by retail suppliers in each State and unpublished revenue indicators from major State public authorities provided by the ABS Public Finance Section. Quarterly estimates are benchmarked to annual data from the publication *Gas Statistics Australia* prepared by The Australian Gas Association.

14.53 Domestic expenditure on electricity and associated services is estimated quarterly using data provided by suppliers in each State as well as unpublished revenue indicators from major State public authorities provided by the ABS Public Finance Section. Quarterly estimates are benchmarked to annual data from the publication *Electricity Australia* published by the Electricity Supply Association of Australia.

14.54 Both annual and quarterly estimates of household expenditure on heating oil, LPG and kerosene are obtained by moving forward benchmark estimates of expenditure based on the periodic Household Expenditure Survey. Composite indicators based on quantities obtained from the monthly publication *Major Energy Statistics* published by the Department of Industry, Science and Resources, together with unpublished price data from the CPI, are used to extrapolate from the benchmarks. For other household fuels (such as firewood), expenditure is estimated using a variety of indicators to move forward benchmark estimates based on the Household Expenditure Survey and other available data sources.

Volume estimates

14.55 Current price estimates of purchases of electricity, gas and other fuels are each revalued using the relevant components of the CPI.

14.56 Chain volume estimates of purchases of electricity, gas and other fuels are derived by aggregating the elemental volume components of the above.

Total: 04 Housing, water, electricity, gas and other fuels

Volume estimates

14.57 Chain volume estimates of this item are derived by aggregating the elemental volume components of the above.

05 FURNISHINGS, HOUSEHOLD EQUIPMENT AND ROUTINE MAINTENANCE OF THE HOUSE

05.1 Furniture and furnishings, carpets and other floor coverings

Description

14.58 Included in this item are personal outlays on new movable household articles such as beds, sofas, tables, chairs and sideboards; lighting equipment; pictures, sculptures, tapestries and other works of art; carpets, rugs and other floor coverings.

Sources and methods

14.59 The periodic Retail Census provides the primary benchmark for this series. The census results are adjusted for sales that are out of scope of the census. Other elements included in the benchmark are sales by manufacturing and wholesale establishments.

Volume estimates

14.60 Current price estimates of purchases of furnishings and floor coverings in Australia are revalued using the relevant components of the CPI.

05.2 Household textiles

Description

14.61 Included in this item are personal outlays on drapery including manchester, bedding, soft furnishings, and the cost of making and installing curtains.

Sources and methods

14.62 The periodic Retail Census provides the primary benchmark for this series. The census results are adjusted for sales which are out of scope of the census. Other elements included in the benchmark are sales by manufacturing and wholesale establishments.

Volume estimates

14.63 Current price estimates of purchases of household textiles in Australia are revalued using the relevant components of the CPI.

05.3 Household appliances

Description

14.64 Included in this item are personal outlays on new major household appliances, whether electric or not, such as refrigerators, washing machines, dishwashers, cookers, heaters, air conditioners (excluding large units installed as an integral part of the dwelling) and vacuum cleaners. Also included is expenditure on small electric household appliances such as coffee-makers, food processors, irons, kettles, fans and electric blankets.

Sources and methods

14.65 The periodic Retail Census provides the primary benchmark for this series. The census results are adjusted for sales which are out of scope of the census. Other elements included in the benchmark are sales by manufacturing, wholesale, and electricity and gas establishments.

Volume estimates

14.66 Current price estimates of purchases of household appliances in Australia are revalued using the relevant components of the CPI.

05.4 Glassware, tableware and household utensils

Description

14.67 Included in this item are personal outlays on new glassware, ceramic ware and chinaware for the table, kitchens, bathrooms, toilet and for indoor decoration; cutlery; non-electric kitchen utensils such as saucepans, frying pans, household scales and other such mechanical devices; and non-electric household articles such as food containers, waste bins, baskets and ironing boards. However, major items of ceramic ware installed in a new bathroom forming part of an extension to an existing dwelling would be treated as alterations and additions to dwellings and included in gross fixed capital formation.

Sources and methods

14.68 The periodic Retail Census provides the primary benchmark for this series. The census results are adjusted for sales that are out of scope of the census. Other elements included in the benchmark are sales by manufacturing and wholesale establishments.

Volume estimates

14.69 Current price estimates of purchases of glassware, tableware and household utensils in Australia are revalued using the relevant components of the CPI.

05.5 Tools and equipment for house and garden

Description

14.70 Included in this item are personal outlays on new garden and workshop tools, both motorised and hand operated; ladders and steps; door and other fittings; and small electrical accessories such as power sockets and switches, electric bulbs and tubes, torches, electric batteries for general use, bells and alarms.

Sources and methods

14.71 The periodic Retail Census provides the primary benchmark for this series. The census results are adjusted for sales that are out of scope of the census. Where appropriate, an estimate is deducted of business purchases and household purchases intended for building (capital formation) or repair and maintenance (intermediate consumption) of the dwelling. Other elements included in the benchmark are sales by manufacturing and wholesale establishments.

Volume estimates

14.72 Current price estimates of purchases of tools and equipment for house and garden in Australia are revalued using the relevant components of the CPI.

05.6 Non-durable household goods

Description

14.73 Included in this item are personal outlays on cleaning and maintenance products such as soaps, washing powders, detergents, disinfectants and insecticides; paper products such as filters, napkins, kitchen paper, aluminium foil and plastic bin liners; articles for cleaning such as brooms, scrubbing brushes, dusters and tea towels; and other non-durable household articles such as matches, candles, clothes pegs, nails, screws, nuts and bolts, glue, string and rubber gloves.

Sources and methods

14.74 The periodic Retail Census provides the primary benchmark for this series. The census results are adjusted for sales that are out of scope of the census. Other elements included in the benchmark are sales by manufacturing and wholesale establishments.

Volume estimates

14.75 Current price estimates of purchases of non-durable household goods in Australia are revalued using the relevant components of the CPI.

Total: 05 Furnishings, household equipment and routine maintenance of the house

Volume estimates

14.76 Current price estimates of purchases by Australian residents overseas of furnishings, household equipment etc. are revalued using a composite index of overseas CPIs.

14.77 Current price estimates of purchases by non-residents in Australia of furnishings, household equipment etc. are revalued using the relevant components of the CPI.

14.78 In deriving the chain volume estimates of purchases of furnishings, household equipment and routine maintenance of the house, the elemental volume estimate of purchases by non-residents in Australia is subtracted from the aggregation of the other elemental volume components above.

06 HEALTH

14.79 This item includes all personal outlays on health products and services. The Medicare levy is considered to be a direct tax on income and is not part of HFCE. The net amount actually paid by households for Medicare-covered services is included. Refunds obtained by households from Medicare are considered to be part of government final consumption expenditure and hence are not included in HFCE. Refunds from health insurance funds are not deducted in calculating these items, but they are offset against the premiums that health insurance funds charge in calculating the insurance service charge that households pay for medical insurance—see Insurance (12.3).

06.1 Medicines, medical aids and therapeutic appliances

Description

14.80 Includes purchases of medicines (both prescription and non-prescription), medical aids and therapeutic appliances (including spectacles and hearing aids) by resident households. Pharmaceutical benefits paid by governments to subsidise the cost of prescribed medicines are included in Government final consumption expenditure.

Sources and methods

14.81 Data from the Retail Census are used as benchmarks and monthly industry data from the survey of Retail Trade as quarterly indicators. For years when census data are not available, annual estimates are derived by summing the quarterly estimates.

Volume estimates

14.82 Current price estimates of purchases of medicines, medical aids and therapeutic appliances in Australia are revalued using the relevant components of the CPI.

06.2 Ambulatory health care

Description

14.83 This component comprises outlays by resident households on ambulatory health care provided by medical practitioners, dentists, opticians, physiotherapists, podiatrists, acupuncturists, clinical psychologists and similar paramedical practitioners.

Sources and methods

14.84 Estimates are obtained using information provided by the Commonwealth Department of Health and Aged Care about fees charged by medical practitioners and other health professionals for services attracting a Medicare benefit. Data from the Australian Institute of Health and Welfare and the Australian Taxation Office are used to compile estimates for those services which do not attract a Medicare benefit.

Volume estimates

14.85 Current price estimates of purchases of ambulatory health care in Australia are revalued using the relevant components of the CPI.

06.3 Hospital, ambulance services and nursing home care

Description

14.86 This component comprises outlays by resident households on in-patient and out-patient health care provided by public and commercial hospitals and nursing homes; and current expenditure by non-profit organisations providing health care. (Hostel accommodation services for the aged or disabled are included in HFCE on Accommodation services (11.2).)

14.87 The fees paid by patients in the long-term care of nursing homes may not cover the entire cost of their stay. In many cases, the deficit is made up by governments agreeing to fund the operating deficit of the nursing home. Current grants by government to NPISHs providing hospital and nursing home care are considered to finance part of the final consumption expenditure of the NPISH and are included in HFCE.

Sources and methods

Outlays by resident households on in-patient and out-patient health care

14.88 Quarterly information about health insurance benefits payable to households for care in hospitals is available from the Private Health Insurance Administration Council. These details provide an indicator for estimating fees paid by households to all types of hospitals. This total may then be split into public and commercial hospitals on the one hand, and private non-profit hospitals on the other. In addition to this, similar quarterly information is received about public hospitals and nursing homes from the State and Territory Health Departments. Quarterly information about transfers from general government (weekly nursing home benefits, and grants to fund operating deficits) is available from the ABS Public Finance Section.

Sources and methods continued

14.89 Annual estimates for public hospitals are the sum of the quarters, although annual reports of the State and Territory Health Departments are used to cross-check the annual totals. Annual benchmark data for public nursing homes, and private hospitals and nursing homes, are taken from the Australian Institute of Health and Welfare *Information Bulletin* which is published about two years after the reference year. Finally, annual information provided by the ABS Public Finance Section is used to benchmark general government transfers for the purpose of health care. This supersedes the quarterly information provided earlier.

Current expenditure by non-profit health care institutions

14.90 This element covers three subcategories: ambulance services, non-profit hospitals and nursing homes, and other non-profit health care institutions.

- *Ambulance services*—expenditure on ambulance services is benchmarked using information contained in State and Territory Auditors'-General Annual Reports and those of the St John's Ambulance Association. No information is available quarterly so quarterly estimates are made using quarterly movements in related series as indicators.
- *Non-profit hospitals and nursing homes*—these are mostly run by religious organisations. The Australian Institute of Health and Welfare *Information Bulletin* does not distinguish profit-making from non-profit hospitals and nursing homes, so in practice the estimates for these establishments are made in conjunction with those for commercial establishments.
- *Other non-profit health care institutions*—this covers organisations such as home nursing services and community health clinics. They are mainly or entirely funded by current grants from general government. Information about these grants is provided quarterly and annually by the ABS Public Finance Section.

Volume estimates

14.91 Current price estimates of purchases of hospital and ambulance services and nursing home care in Australia are revalued using the relevant components of the CPI.

Total: 06 Health

Volume estimates

14.92 Current price estimates of purchases of health services by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.93 Current price estimates of purchases of health services by non-residents in Australia are revalued using the relevant components of the CPI.

14.94 In deriving the chain volume estimates of purchases of health services, the elemental volume estimate of purchases by non-residents in Australia is subtracted from the aggregate of the other elemental volume components above.

07.1 Purchase of vehicles

Description

14.95 The scope of this item is purchases of new motor vehicles by households for personal use; net purchases of used vehicles by households from businesses and government authorities; private importation of used vehicles from overseas; and dealers' margins on used vehicles traded between households through dealers.

14.96 The stamp duties payable on first registration and transfer of ownership of motor vehicles are treated as direct taxes, and as such they are not part of HFCE.

Sources and methods

Purchases of new motor vehicles

14.97 This item is estimated quarterly and the annual estimates are produced by summing the quarterly estimates. The number of new motor vehicle sales by type and ownership (private and non-private) is obtained from the Federal Chamber of Automotive Industries VFACTS service. An average price for each type of vehicle purchased is estimated each year using information published in *Glass's Guide for Passenger Vehicles* and automotive magazines, and extrapolated using information collected for the CPI. The value of purchases of new motor vehicles is obtained by multiplying the estimated number of private purchases by the estimated average price.

Purchases of used vehicles from other sectors

14.98 Businesses and government authorities are assumed to buy mainly new vehicles. It therefore follows that when these sectors sell vehicles they are mainly purchased by households. The number of such sales is calculated using information from *Survey of Motor Vehicle Use, Australia* (Cat. no. 9208.0). An average price for each type of second-hand vehicle is estimated for a base period using information contained in automotive magazines and moved forward using new vehicle prices lagged by two years. The value of purchases of used vehicles from other sectors is estimated by multiplying the estimated number of household purchases by the estimated average prices.

14.99 Private imports of used vehicles are generally restricted to specialty and high-performance vehicles which are generally not otherwise available in Australia. Estimates of the value of these imports are based on information supplied with Customs documentation.

Dealers' margins

14.100 Dealers' margins on used vehicles traded between households through dealers are estimated using information provided from the Retail Census. The latest quarterly estimates are made using movements in purchases of new motor vehicles as the indicator.

Volume estimates

14.101 Current price estimates of purchases of motor vehicles by Australian residents in Australia are revalued using the relevant component of the CPI.

14.102 Current price estimates of purchases of motor vehicles by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.103 Chain volume estimates of purchases of motor vehicles are derived by aggregating the elemental volume components of the above.

07.2 Operation of personal transport equipment

Description

14.104 The scope of this item is expenditure incurred in running household motor vehicles. Three broad categories of expenditure are covered:

- *motoring goods*—purchases of fuel, tyres and batteries;
- *repair and maintenance expenditure*, including the cost of oil changes, tuning and other servicing, and panel beating; and
- *miscellaneous motoring expenditure*—toll fees, membership fees paid to motoring associations, parking fees, vehicle inspection fees, car rental fees, garage hire, drivers' licence fees, driving school fees, the cost of personalised number plates, and the cost of ferry transport for personal vehicles.

14.105 Motor vehicle registration fees are considered to be direct taxes when they are paid by persons in respect of vehicles used for private rather than business purposes and are not part of HFCE. Drivers' licence fees are treated as service income of general government and hence are included in HFCE. Parking fines are treated as Other current transfers from households to general government. (Prior to the introduction of SNA93, both drivers' licence fees and parking fines were part of Other direct taxes, fees and fines. The SNA93 treatment has been applied for the entire time series.)

Sources and methods

Motoring goods

14.106 Household expenditure on petrol is the most important of these purchases. The annual estimates are obtained by multiplying the following four elements:

- the number of personal vehicles registered by broad type of vehicle from *Survey of Motor Vehicle Use, Australia* (Cat. no. 9208.0);
- the average number of kilometres travelled by these vehicles for personal reasons (from the Survey of Motor Vehicle Use);
- the rate of petrol consumption for each type of vehicle (derived from the Survey of Motor Vehicle Use); and
- the average retail price per litre of petrol, which is obtained from the CPI (similar calculations are made for personal vehicles powered by distillate and LPG).

Sources and methods continued

14.107 Estimates of household expenditure on replacement tyres and tubes are calculated by allocating a proportion of total sales from the benchmark Retail Census to households. The household share of sales is estimated by comparing the number of kilometres travelled for personal reasons with the number travelled on business from the Survey of Motor Vehicle Use. Finally, an estimate of the average price paid by consumers obtained from the CPI is used to derive the expenditure estimate. Household expenditure on replacement batteries is calculated as household demand for batteries per year (based on the proportion of total kilometres travelled) multiplied by an average price paid by consumers, obtained from the CPI.

14.108 Estimates of household expenditure on car accessories are based on benchmark data from the periodic Household Expenditure Survey. Benchmark estimates are moved forward using movements in personal vehicle registrations as the indicator. Motoring goods comprise the sum of fuel, tyres, batteries and car accessories.

14.109 Quarterly estimates for household expenditure on automotive fuels are made using volumes sold (as reported in Major Energy Statistics published monthly by the Commonwealth Department of Industry, Science and Resources) and prices per litre (from the CPI) as indicators. Other motoring goods, which are a relatively small part of the total, are estimated using quarterly movements in related series as indicators.

Repair and maintenance expenditure

14.110 Annual estimates of household expenditure on motor vehicle repair and maintenance is based on information from the Retail Census and the Household Expenditure Survey. Three separate components are estimated:

- *expenditure on service and repairs, including parts*, is benchmarked to the latest Retail Census. The household share is estimated by comparing the number of kilometres travelled for personal reasons with the number travelled on business from the Survey of Motor Vehicle Use. Benchmark estimates are moved forward using quarterly data on retail sales of motor fuel and the price of services and repairs from the CPI as indicators;
- *purchases of parts other than those used in service and repair* is benchmarked to data from the Household Expenditure Survey. Benchmark estimates are moved forward using quarterly data on retail sales of motor fuel as the indicator; and
- *expenditure on panel beating and smash repairs* is benchmarked to the Retail Census and is moved forward using motor vehicle property insurance claims as the indicator.

Sources and methods continued

14.111 Quarterly estimates of household expenditure on automotive repairs and maintenance are extrapolated from the annual series detailed above, using an indicator which is the product of total kilometres travelled by households and the CPI series for motor vehicle service and repairs. A similar procedure is applied for panel beating except that the indicator used is motor vehicle property insurance claims.

Miscellaneous

14.112 The multitude of small components making up miscellaneous motoring expenditure are estimated using many data sources and methods. The main sources for the annual estimates are State and Territory Auditors'-General Reports and *Government Finance Statistics, Australia* (Cat. no. 5512.0). Benchmark estimates are moved forward using the CPI series for motor vehicle charges and the number of registered personal vehicles as indicators.

14.113 There is very little quarterly information about miscellaneous expenditure on the operation of personal motor vehicles and, for the most part, the quarterly estimates are compiled using the movements in related series as indicators.

Volume estimates

14.114 Current price estimates of expenditures on fuels and lubricants, other motor vehicle goods, and repairs and maintenance by Australian residents in Australia, are each revalued using the relevant components of the CPI.

14.115 Current price estimates of expenditures on these commodities by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.116 Chain volume estimates of expenditures on the operation of personal transport equipment are derived by aggregating the elemental volume components of the above.

07.3 Transport services

07.3.1 Passenger transport by railway

Description

14.117 The scope of this item is personal outlays on suburban, country and interstate rail fares. The value of fare concessions provided by general government to students, pensioners, etc., is regarded as part of Government final consumption expenditure.

Sources and methods

14.118 Household expenditure on services provided by government transport authorities is obtained from the annual reports of the various authorities. Quarterly estimates are based on unpublished revenue indicators obtained from the State public authorities by the ABS Public Finance Section.

Volume estimates

14.119 Expenditures on rail fares in Australia are revalued using the relevant component of the CPI.

07.3.2 Passenger transport by road

Description

14.120 The scope of this item is personal outlays on suburban, country and interstate bus fares (including charter fares); tram fares; taxi and hire-car fares. The value of fare concessions provided by general government to students, pensioners, etc., is regarded as part of Government final consumption expenditure.

Sources and methods

14.121 Household expenditure on services provided by government transport authorities is obtained from the annual reports of the various authorities. Total fares collected are discounted to take account of business use of these services. Quarterly estimates are based on unpublished revenue indicators obtained from the State public authorities by the ABS Public Finance Section.

14.122 Household expenditure on local services provided by private bus companies is obtained from the State government motor transport departments as well as data collected specially by the ABS. A small deduction is made from total fares collected to account for business use of these services. Quarterly estimates are calculated using the same indicators as for public transport authorities.

14.123 Personal outlays on interstate bus fares are estimated from data provided to the ABS each quarter by major interstate bus operators, as well as from their published annual reports. Estimates are benchmarked to the results of research undertaken within the ABS.

14.124 Personal outlays on taxi and hire car fares are estimated using information contained in the published annual reports of State motor transport departments and any available studies of taxi operations and revenue. The quarterly estimates are compiled using CPI data for price changes, and estimated usage.

Volume estimates

14.125 Expenditures on bus fares and taxi fares in Australia are each revalued using the relevant components of the CPI.

07.3.3 Passenger transport by air

Description

14.126 The scope of this item is personal outlays on airfares purchased in Australia and overseas by residents.

Sources and methods

Domestic airfares

14.127 Quarterly estimates are prepared from data provided by resident airlines. The annual estimate is the sum of four quarters. Household Expenditure Survey data, when available, are used to cross-check the estimates.

Sources and methods continued

International airfares

14.128 Both annual and quarterly information are provided by the ABS Balance of Payments Section. Estimates for the latest quarters are made using information about international airfares from the CPI and about international departures taken from *Overseas Arrivals and Departures, Australia* (Cat. no. 3401.0).

Volume estimates

14.129 Expenditures on domestic and overseas airfares in Australia are each revalued using the relevant components of the CPI.

07.3.4 Passenger transport by sea and inland waterway

Sources and methods

Ferry and coastal shipping fares

14.130 The annual estimates are compiled using information contained in the annual reports of public transport authorities, the ABS Transport Industry Survey, and unpublished information provided by the Commonwealth Department of Transport and Regional Services. The quarterly estimates are based on passenger revenue information provided by the larger public enterprises.

International shipping fares

14.131 Both annual and quarterly information are provided by the ABS Balance of Payments Section. Estimates for the latest quarters are made using information about international airfares from the CPI and information about international departures taken from *Overseas Arrivals and Departures, Australia* (Cat. no. 3401.0).

Volume estimates

14.132 Expenditures on domestic shipping fares in Australia are revalued using the relevant component of the CPI.

14.133 Expenditures on overseas shipping fares in Australia are revalued using a specially constructed cruise ship price index.

Total: 07.3 Transport services

Volume estimates

14.134 Current price estimates of expenditures on transport services by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.135 Current price estimates of expenditure on transport services by non-residents in Australia are revalued using the relevant component of the CPI.

14.136 In deriving the chain volume estimates of expenditure on transport services, the elemental volume estimate of expenditure by non-residents in Australia is subtracted from the aggregate of the other elemental volume components above.

Total: 07 Total transport

Volume estimates

4.137 Chain volume estimates of expenditures on transport are derived by aggregating the elemental volume components of the above.

08 COMMUNICATIONS

08.1 Postal services

Description

14.138 The scope of this item is household purchases of domestic and international postal and courier services, and the hire of mail boxes and mail bags.

Sources and methods

14.139 Households' expenditure on postal services is estimated from quarterly data provided by Australia Post on sales of postage labels, and the hire of mail boxes and mail bags. An allowance is made for hiring of boxes and bags by business. The annual estimates are the sum of four quarters.

Volume estimates

14.140 Current price estimates of expenditures on postal services in Australia are revalued using the relevant component of the CPI.

08.2 Telecommunication services

Description

14.141 The scope of this item is household expenditure on rental of telephones, connection and rearrangement of domestic telephone services, and domestic and international telephone, facsimile and internet services. Purchase of telecommunications equipment is included under Audio visual, photographic, data processing equipment and accessories (09.1).

Sources and methods

14.142 Expenditure on telephone (and facsimile) services is estimated from quarterly data provided by major service providers. The annual estimates are the sum of four quarters.

14.143 Expenditure on internet services is based on benchmark data from *Household Use of Information Technology, Australia* (Cat. no. 8146.0). Data on the proportion of households with home internet access and expenditure on internet services is used in conjunction with the estimated number of resident households from *Australian Demographic Statistics* (Cat. no. 3101.0), to estimate total household expenditure on internet services.

Volume estimates

14.144 Current price estimates of expenditures on telecommunication services in Australia are revalued using the relevant component of the CPI.

Total: 08 Communications

Volume estimates

14.145 Current price estimates of expenditures on communication services by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.146 Current price estimates of expenditure on communication services by non-residents in Australia are revalued using the relevant component of the CPI.

Volume estimates continued

14.147 In deriving the chain volume estimates of expenditure on communication services, the elemental volume estimate of expenditure by non-residents in Australia is subtracted from the aggregate of the other elemental volume components above.

09 RECREATION AND CULTURE

09.1 Audio-visual, photographic and data processing equipment and accessories

Description

14.148 Included in this item are new purchases by resident households of radio, television and hi-fi equipment, personal computers, telecommunications equipment, video equipment, cameras and musical instruments.

Sources and methods

14.149 The periodic Retail Censuses and Household Expenditure Surveys provide the primary benchmarks for this series. The latest benchmark is moved forward using data from the monthly Survey of Retail Trade.

Volume estimates

14.150 Current price estimates of purchases of audio-visual equipment excluding computers in Australia are revalued using the relevant component of the CPI.

14.151 Current price estimates of purchases of computer equipment in Australia are revalued using the relevant component of the CPI. The CPI for computer equipment is derived from a hedonic price index compiled by the U.S. Bureau of Labor Statistics. The current price estimates of this component are derived using a supply-use model (see Chapter 15 for further details).

14.152 Current price estimates of purchases of audio-visual equipment, photographic and data processing equipment and accessories by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.153 Current price estimates of purchases of audio-visual equipment, photographic and data processing equipment and accessories by non-residents in Australia are revalued using the relevant components of the CPI.

14.154 In deriving the chain volume estimates of purchases of audio-visual equipment, photographic and data processing equipment and accessories, the elemental volume estimate of purchases by non-residents in Australia is subtracted from the aggregate of the other elemental volume components above.

09.2 Other major durables for recreation and culture

Description

14.155 Included in this item are expenditures by households on the new purchase and hire of aeroplanes, microlight aircraft, gliders, hang-gliders, hot air balloons, boats, caravans, trailers, bicycles and all camping and sporting equipment.

Sources and methods

14.156 The periodic Retail Census provides the primary benchmarks for this series. The latest benchmark is moved forward using data from the monthly Survey of Retail Trade.

Volume estimates

14.157 Current price estimates of purchases of other major durables for recreation and culture by Australian residents in Australia are revalued using the relevant components of the CPI.

14.158 Current price estimates of purchases of other major durables for recreation and culture by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.159 The chain volume estimates of other major durables for recreation and culture are derived by aggregating the elemental volume components above.

09.3 Other recreational items and equipment

Description

14.160 Included in this item are purchases by resident households of other recreational items and equipment such as toys and games; flowers and garden supplies; and pets, pet food (excluding that fed to racing animals) and pet products.

Sources and methods

14.161 The periodic Retail Censuses and Household Expenditure Surveys provide the primary benchmarks for this series. The latest benchmark is moved forward using data from the monthly Survey of Retail Trade.

Volume estimates

14.162 Current price estimates of purchases of other recreational items and equipment by Australian residents in Australia are revalued using the relevant components of the CPI.

14.163 Current price estimates of purchases of other recreational items and equipment by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.164 The chain volume estimates of other recreational items and equipment are derived by aggregating the elemental volume components above.

09.1 + 09.2 + 09.3 Goods for recreation and culture

Volume estimates

14.165 Chain volume estimates of purchases of goods for recreation and culture are derived by aggregating the elemental volume components above.

09.4 Recreational and cultural services

09.4.1 Sporting and recreational services

Description

14.166 This component covers several items grouped into three subcategories: the net cost of racing animals; the cost of hiring entertainment equipment and facilities; and current expenditure of private non-profit institutions providing sporting and recreational services.

Sources and methods

Net cost of racing animals

14.167 The net cost of racing horses, trotters and dogs covers the cost of training and feeding the animals, the cost of transporting them to race tracks, entrance and registration fees, and charges for veterinary services less any prize moneys won. The estimate of charges for veterinary services is based on information from Taxation Statistics, and the other elements of this estimate are based on research undertaken in the ABS. The latest years and quarters are estimated using movements in related series.

Hire of sporting equipment and facilities

14.168 This estimate covers the cost of hiring sporting equipment; payment of green fees, and charges for sports lessons and fitness classes; the cost of hiring sporting facilities such as tennis courts, squash courts and bowling alleys; and the use of ski lifts. The estimate is benchmarked using data from the Retail Censuses and the Selected Services Industries Surveys, and is moved forward using movements in related series.

Current expenditure of private non-profit institutions serving households

14.169 This covers expenditure of such bodies as bowling, golf, RSL, football and racing clubs. Compensation of employees and liquor licensing fees make up most of the expenditure of these non-profit institutions. The former is based on quarterly data from the Survey of Employment and Earnings, and the latter is based on information contained in the annual reports of State licensing boards.

Volume estimates

14.170 Current price estimates of expenditures on sporting and recreational services in Australia are revalued using the relevant components of the CPI.

09.4.2 Cultural and entertainment services

Description

14.171 The scope of this item is all outlays (except those covered in 9.4.1 and 9.4.3) by resident households on recreational, cultural and entertainment services; and current expenditure by private non-profit institutions providing recreational, cultural and entertainment services. This item is further categorised into Cinema and other admissions; Pay TV; Television and video hire; and Veterinary and other services for pets.

Sources and methods

Cinema and other admissions

14.172 Quarterly information about box office takings for cinemas is provided by the Motion Pictures Distributors Association of Australia. Admissions to places of culture and entertainment (such as museums, libraries, art galleries, exhibitions, theme parks, opera, ballet, plays and concerts) and admission to sports stadia, horse racing tracks, etc., are benchmarked using the Household Expenditure Survey, and the latest years and quarters are estimated using various indicators. Information about admissions to public galleries, museums etc. is obtained from Auditors'-General Reports, published annual reports, and *Government Finance Statistics, Australia* (Cat. no. 5512.0).

Pay TV

14.173 This estimate covers the cost of installation and subscription to pay TV services. Expenditure on pay TV is based on information from the publication *Digital Broadcast Australia*.

Television, video hire

14.174 This estimate covers the cost of hiring television sets, video cassette recorders and video tapes; and video club membership fees. The estimate is benchmarked using data from the Retail Censuses and the Selected Services Industries Surveys and is moved forward using movements in related series.

Veterinary and other services for pets

14.175 This estimate covers the cost of veterinary and other services for pets such as grooming and boarding. Estimates are based on data from the Household Expenditure Survey.

Volume estimates

14.176 Current price estimates of expenditures on cultural and entertainment services in Australia are revalued using the relevant components of the CPI.

09.4.3 Net losses from gambling

Description

14.177 Separate estimates are made for net losses by resident households on poker and gaming machines, bookmakers and totalisators, lotto and lotteries, casinos, soccer pools, keno, instant lotteries, bingo and other minor gambling.

Sources and methods

14.178 Estimates of net losses by resident households on gambling are benchmarked to information published in *Australian Gambling Statistics* by the Tasmanian Gaming Commission. This publication provides comprehensive annual data on gambling in Australia. Quarterly estimates are made using data on gambling taxes provided by the quarterly Public Authority Finance system as indicators. Quarterly data are available on poker and gaming machine tax; racing taxes, turnover and dividends paid; lotto and lotteries ticket sales and prizes paid; casino taxes levied; as well as taxes paid on soccer pools, keno, instant lotteries and minor gambling.

Volume estimates

14.179 Net losses from personal outlays on gambling by households are revalued using the CPI for all groups excluding health 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, of net losses from gambling.

Total: 09.4 Recreational and cultural services

Volume estimates

14.180 Current price estimates of expenditures on recreational and cultural services by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.181 Current price estimates of expenditure on recreational and cultural services by non-residents in Australia are revalued using the relevant components of the CPI.

14.182 In deriving the chain volume estimates of expenditure on recreational and cultural services, the elemental volume estimate of expenditure by non-residents in Australia is subtracted from the aggregate of the other elemental volume components above.

09.5 Newspapers, books and stationery

Description

14.183 The scope of this item is personal outlays on books, stationery, newspapers, periodicals, magazines and artists goods.

Sources and methods

14.184 The periodic Retail Census provides the primary benchmarks for this series. The latest benchmark is moved forward using data from the monthly Survey of Retail Trade.

Volume estimates

14.185 Current price estimates of purchases of newspapers, books etc. by Australian residents in Australia are revalued using the relevant components of the CPI.

14.186 Current price estimates of purchases of newspapers, books etc. by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.187 Chain volume estimates of purchases of newspapers, books etc. are derived by aggregating the elemental volume components of the above.

Description

14.188 The scope of this item is household expenditure on educational services, and current grants by government to non-profit educational institutions serving households (non-government schools). Examples of the types of expenditure covered are: Higher Education Contributions (HECS), tuition fees paid to pre-schools, primary and secondary schools and post-secondary institutions; household donations to tertiary institutions; and current expenditure (except interest and depreciation) of non-government schools and similar non-profit educational organisations. Current expenditure of non-government schools is estimated as the sum of fees paid by households to these schools and current grants received from general government.

Sources and methods

Tertiary Education

14.189 HECS comprises receipts from the HECS trust fund and up-front payments made by students. Data are currently supplied by the Department of Education, Training and Youth Affairs, but will be supplied directly by universities in future. Total tertiary education fees comprise household grants, private university tuition fees and full up-front fees for fee approved courses. Data for 1991 and later years are from *Selected Higher Education Finance Statistics* published by the Department of Education, Training and Youth Affairs. Student union fees at post secondary tertiary institutions are included in HFCE on Other goods and services (12.5).

Post Secondary

14.190 Total fees include tuition fees paid to Technical and Further Education (TAFE) colleges, and tuition fees paid to adult education centres. Data for 1991 and later years are from *Selected Vocational Education and Training Statistics and Overseas Student Statistics*, published by the Department of Education, Training and Youth Affairs.

Primary and Secondary Education

14.191 Total expenditure on primary and secondary education includes tuition fees paid by households to government schools, private tutoring services for students, and current expenditure (except interest and depreciation) by non-profit educational organisations serving households. Tuition fees paid to government primary and secondary schools are estimated separately by multiplying the number of enrolments by an average cost per student. Enrolment statistics are available annually from the ABS publication *Schools, Australia* (Cat. no. 4221.0). The average cost per student is periodically benchmarked from the Household Expenditure Survey (HES). Estimates of the average cost per student for non-HES years are derived using movements in the CPI education series. Data on current expenditure of non-profit organisations are obtained from an annual survey by the Department of Education, Training and Youth Affairs. Expenditure on private tutoring services is benchmarked from HES. Estimates for non-HES years are moved forward using the CPI education series.

Sources and methods continued

Preschools

14.192 Fees paid to preschools are estimated using enrolment and average fees information. The preschool enrolment data are available triennially from *Child Care, Australia* (Cat. no. 4402.0). Average fees are benchmarked from HES data and moved forward using the CPI child care series.

14.193 Quarterly estimates are derived by an equal allocation of calendar year estimates.

Volume estimates

14.194 Current price estimates of purchases of education services by Australian residents in Australia are revalued using the relevant components of the CPI.

14.195 Current price estimates of purchases of education services by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.196 Chain volume estimates of purchases of education services are derived by aggregating the elemental volume components of the above.

11 HOTELS, CAFES AND RESTAURANTS

11.1 Catering

Description

14.197 This item comprises personal outlays on meals and beverages, both alcoholic and non-alcoholic, at restaurants, cafes, hotels, clubs and similar catering establishments. Expenditure includes both the cost of food and beverages supplied and the cost of the service component. Expenditure on meals associated with business travel is not included in this component of HFCE, as it is regarded as intermediate consumption of the business.

Sources and methods

14.198 Benchmark data are available from the periodic *Hospitality Industries, Australia* (Cat. no. 8674.0); and *Clubs, Pubs, Taverns and Bars, Australia* (Cat. no. 8687.0). Quarterly estimates are derived using data from the monthly Survey of Retail Trade as indicators.

Volume estimates

14.199 Expenditures on catering by Australian residents in Australia are revalued using the relevant component of the CPI.

14.200 Expenditures on catering by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.201 Chain volume estimates of expenditures on catering are derived by aggregating the elemental volume components above.

11.2 Accommodation services

Description

14.202 The scope of this item comprises personal outlays on temporary accommodation services such as those provided by hotels, motels, guest houses, boarding schools, university halls of residence and short-stay caravans; and hostel accommodation services for the aged or disabled (but nursing home services providing medical supervision are included in HFCE on Health (06.3)).

Sources and methods

14.203 Benchmark data are available from the periodic *Hospitality Industries, Australia* (Cat. no. 8674.0); and *Accommodation Industry, Australia* (Cat. no. 8695.0). Quarterly estimates are derived using data from *Tourism Indicators, Australia* (Cat. no. 8634.0), and *Tourist Accommodation, Australia* (Cat. no. 8635.0) as indicators.

14.204 The estimates of household expenditure on hostel accommodation for the aged or handicapped are based on information from The Australian Institute of Health and Welfare in respect of 1992–93 patient fees and Commonwealth benefits paid for this type of service. Average weekly earnings are used as an indicator series.

Volume estimates

14.205 Current price estimates of purchases of accommodation services by Australian residents in Australia are revalued using the relevant component of the CPI.

14.206 Current price estimates of purchases of accommodation services by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.207 Chain volume estimates of purchases of accommodation services are derived by aggregating the elemental volume components above.

Total: 11 Hotels, cafes and restaurants

Volume estimates

14.208 Chain volume estimates of expenditures on hotels, cafes and restaurants are derived by aggregating the elemental volume components above.

12 MISCELLANEOUS GOODS AND SERVICES

12.1 Personal care

Description

14.209 Included in this item are personal outlays on hairdressing and beauty salon services, perfume, cosmetics, soap products and other toiletries.

Sources and methods

14.210 Results from the Household Expenditure Survey and Retail Census are used to provide benchmark values for these items. The census results are adjusted for sales which are out of scope of the census such as sales by organisations selling directly to the public. Various indicators are used to extrapolate annual and quarterly estimates.

Volume estimates

14.211 Current price estimates of purchases of personal care services by Australian residents in Australia are revalued using the relevant components of the CPI.

14.212 Current price estimates of purchases of personal care services by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.213 Chain volume estimates of purchases of personal care services are derived by aggregating the elemental volume components above.

12.2 Personal effects

Description

14.214 Included in this item are personal outlays on jewellery, watches and clocks purchased from retail outlets; and other personal effects including articles for babies, travel goods and miscellaneous personal articles.

Sources and methods

14.215 Results from the Household Expenditure Survey and Retail Census are used to provide benchmark values for these items. The census results are adjusted for sales which are out of scope of the census such as sales by organisations selling directly to the public.

Volume estimates

14.216 Current price estimates of purchases of personal effects by Australian residents in Australia are revalued using the relevant components of the CPI.

14.217 Current price estimates of purchases of personal effects by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.218 Chain volume estimates of purchases of personal effects are derived by aggregating the elemental volume components above.

12.3 Insurance

Description

14.219 Included in this item is the service charge paid by householders for insurance. Premiums paid for casualty 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. The insurance service charge for non-life insurance is calculated as premiums paid plus premium supplements (see the next paragraph) less expected claims incurred. Expected claims are derived by using a centred five year moving average of claims incurred. The insurance service charge for life insurance and superannuation funds is equal to the administrative expenses of operating the funds. Profits of non-mutual funds are also included in the insurance service charge.

14.220 Premium supplements represent the income earned on the investment of insurance technical reserves (prepaid premiums and reserves against outstanding claims). 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. It is therefore 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. 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

Description continued

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. (See also the discussion of rerouted transactions in Chapter 7.)

Sources and methods

Casualty insurance of householders' effects

14.221 This is the service charge for insuring householders' furniture and effects, generally called home contents insurance. Insurance of the dwelling itself is excluded from HFCE as it is considered to be part of the intermediate consumption of the industry Ownership of dwellings.

(a) Annual estimates

14.222 Premiums and claims for casualty insurance of householders' effects are obtained from *Selected Statistics on the General Insurance Industry*, published by the Australian Prudential Regulation Authority. Expected claims are derived by using a centred five year moving average of claims incurred.

14.223 Premium supplements are added together with personal premiums to give the total value of premiums. Premium supplements are calculated using the proportion of casualty insurance of householders' effects business to total casualty insurance business, multiplied by total investment earnings on casualty insurance technical reserves.

14.224 Personal premiums paid plus premium supplements less expected personal claims incurred gives the value of the service charge which is included in HFCE.

14.225 Data from the Australian Prudential Regulation Authority are generally available with a lag of about one year, so that the insurance service charge for the most recent year is estimated using a linear trend extrapolation method.

(b) Quarterly estimates

14.226 Quarterly estimates of the insurance service charge for casualty insurance of householders' effects are made using a linear trend interpolation and extrapolation method.

Motor vehicle insurance

14.227 Motor vehicle insurance service charges cover both compulsory third party (personal injury) insurance, and comprehensive and third party property insurance on motor vehicles.

Sources and methods continued

(a) Annual estimates

14.228 Premiums and claims for motor vehicle property and compulsory third party (personal injury) insurance are obtained separately from *Selected Statistics on the General Insurance Industry*, published by the Australian Prudential Regulation Authority. In order to estimate premiums paid and claims incurred by households for insurance, total premiums paid and claims incurred in each category are multiplied by the proportion of personal vehicles to business and government vehicles. Expected claims are derived by using a centred five year moving average of claims incurred.

14.229 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 each type of insurance business to total casualty insurance business, multiplied by total investment earnings on casualty insurance technical reserves.

14.230 Personal premiums paid plus premium supplements less expected personal claims incurred gives the value of the service charge which is included in HFCE.

14.231 Data from the Australian Prudential Regulation Authority are generally available with a lag of about one year, so that estimates are extrapolated for the most recent year. Premiums for the latest year are estimated using a CPI motor vehicle insurance series in combination with the number of registered vehicles owned by households.

(b) Quarterly estimates

14.232 Quarterly estimates of compulsory third party (personal injury) insurance premiums are made using a composite indicator based on the estimated number of registered motor vehicles owned by households in the quarter and a price index for this type of premium obtained from the CPI. The corresponding annual expected claims incurred are allocated to quarters using the composite indicator used for premiums. The quarterly insurance service charge is the difference between quarterly premiums, including premium supplements, and expected claims incurred.

14.233 Quarterly estimates of the motor vehicle property insurance service charge are derived in a similar manner to that described for compulsory third party insurance. The estimate of premiums is made using the estimated number of registered motor vehicles owned by households in the quarter multiplied by an estimate of the premium payable on the average comprehensive motor vehicle insurance policy for a personal vehicle, adjusted to allow for vehicles without comprehensive insurance. The corresponding annual expected claims incurred are allocated to quarters using the composite indicator used for premiums. The quarterly insurance service charge is the difference between quarterly premiums, including premium supplements, and expected claims incurred.

Sources and methods continued

Health Insurance

14.234 The insurance service charge for health insurance is calculated in the same way as for casualty insurance of householders' effects. Personal premiums paid plus premium supplements less expected personal claims incurred gives the value of the service charge which is included in HFCE.

14.235 Information about premiums paid and claims incurred by households from health insurers is obtained from *Operations of Registered Health Insurance Organisations* published annually by the Commonwealth Department of Health and Aged Care. Expected claims are derived by using a centred five year moving average of claims incurred.

14.236 Premium supplements are added together with personal premiums to give the total value of premiums. Premium supplements are calculated from the investment earnings on insurance technical reserves of health insurance funds.

14.237 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

14.238 This is the service charge for various classes of insurance which are taken out by households, but which have not been explicitly discussed elsewhere in this chapter. Included are travel, consumer credit, marine hull, and sickness and accident.

(a) Annual estimates

14.239 Premiums and claims for the relevant classes of insurance business are obtained from *Selected Statistics on the General Insurance Industry*, published by the Australian Prudential Regulation Authority. 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.

14.240 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 casualty insurance premiums, multiplied by total investment earnings on casualty insurance technical reserves.

14.241 Personal premiums paid plus premium supplements less expected personal claims incurred gives the value of the service charge which is included in HFCE.

Sources and methods continued

14.242 Data from the Australian Prudential Regulation Authority are generally available with a lag of about one year, so that the insurance service charge for the most recent year is estimated using a linear trend extrapolation method.

(b) Quarterly estimates

14.243 Quarterly estimates of the insurance service charge for other non-life insurance are made using a linear trend interpolation and extrapolation method.

Life insurance and superannuation

14.244 Premiums paid by policy holders to life insurance offices are considered to include an insurance service charge element. The insurance service charge is calculated as the sum of wages, administrative expenses (excluding interest paid) and profits of life insurance offices. A further adjustment is made to exclude rental expenses incurred in generating property income from administrative expenses. Dividends paid are used as an indicator of profits earned by life insurance offices. A significant 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 HFCE) and invests in life insurance and superannuation funds (recorded in the households financial account). (See also the discussion of rerouted transactions in Chapter 7.)

14.245 The same treatment is applied where superannuation funds bear administrative costs.

14.246 Benchmark data on the operations of life insurance offices and superannuation funds are published annually by the Australian Prudential Regulation Authority, generally with a lag of about one year, so that estimates are extrapolated for the most recent year. Quarterly estimates are interpolated and extrapolated from annual benchmarks using a linear trend method.

Workers' compensation insurance

14.247 The SNA93 recommendation is to include workers' compensation insurance premiums in compensation of employees as part of employers' social contributions. The SNA has always recommended this treatment. However, the ABS did not adopt this treatment in the past because the view was taken that the compulsory nature of workers' compensation payments in Australia implied that it was more appropriate for the insurance service charge to be borne by employers than by employees. The insurance service charge measures the value of services provided by the insurance enterprises in arranging payments of claims in exchange for the receipts of premiums. While Australia's institutional

Sources and methods continued

arrangements are unchanged with regard to the compulsory nature of workers' compensation insurance, SNA93 is explicit in its recommendation that the compulsory nature of the schemes is not a sufficient condition for adopting a different treatment. The insurance service charge for workers compensation insurance paid by employers is now included in household final consumption expenditure for all periods, in line with SNA93 recommendations.

Volume estimates

14.248 Current price estimates of purchases of insurance services (consisting of household effects, motor vehicle insurance, health insurance, life insurance, and workers compensation) by Australian residents in Australia are each revalued using the implicit price deflator derived from an output indicator used for volume estimates of the gross value added of the insurance industry (see Chapter 24 for further details) and its current price counterpart.

14.249 Current price estimates of purchases of insurance by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.250 Chain volume estimates of purchases of insurance services are derived by aggregating the elemental volume components above.

12.4 Financial services n.e.c.

Description

14.251 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.

14.252 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; entry and management fees paid to growth funds and unit trusts; brokerage on share trading; and financial advisers' charges.

14.253 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 HFCE.

14.254 The last component is the indirectly charged service charges of banks and other similar financial intermediaries.

Description continued

14.255 In the national accounts the production of financial services of banks and other financial intermediaries is allocated to the users of those services, both depositors and borrowers. Because interest is 'property income' (i.e. income earned on a non-produced asset) it is not treated as an income or expense item in the derivation of an industry's gross product or value added. Consequently, financial intermediaries would generally be shown to have a negative value added. To overcome this apparent anomaly, a method of estimating gross output has been developed to more realistically measure the services that financial intermediaries provide to borrowers and depositors. An imputation is made for the value of the services provided by financial intermediaries, which is referred to as 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 service is implicit in either or both of the higher interest paid by borrowers or 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 HFCE. FISIM relating to mortgages on dwellings owned by persons is not include in HFCE, but is treated as a component of intermediate consumption in the calculation of GOS for dwellings owned by persons.

Sources and methods

Annual estimates

14.256 The total value of explicit charges paid by the customers of financial institutions is estimated using information from ABS collections from financial corporations. It is assumed that all explicit charges for unit trusts are borne by households. For other financial intermediaries, the proportion of the total paid by households has been assumed to be constant for recent years. This assumption is periodically reviewed.

14.257 Information about total taxes on production and imports paid on financial transactions is obtained directly from Commonwealth and State budget papers. The proportion of the total passed on by the financial institutions to households in the form of associated charges is estimated for each State and Territory. The proportion has been assumed to be constant for recent years. This assumption is reviewed periodically.

14.258 The total value of explicit charges paid by households is calculated using data from the following sources: annual reports of the various financial institutions, the various ABS collections from financial corporations, data collected by the Reserve Bank under the Banking Act, State Auditors'-General Reports, the ABS Public Finance Section and Taxation Statistics.

Sources and methods continued

14.259 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. Conceptually, the reference rate must lie between the loan and deposit rates, and so a margin or price for each loan and deposit can be established. In practice, the reference rate of interest is assumed to be midway between the average interest rates on loans and on deposits. FISIM is thus equal to the average balance on loans or deposits multiplied by the relevant interest margin. To calculate the amount of FISIM paid by households, interest rates charged by financial institutions on consumer loans and interest rates paid on households' deposits are compared with the reference interest rate to calculate the margins. These margins are then multiplied by the average balance on loans and deposits.

Quarterly estimates

14.260 Linear trend interpolation methodology is used to transform into quarterly estimates the annual estimates of explicit charges levied by banks, taxes on production and imports passed on to households, FISIM, and the insurance service charges.

14.261 Explicit charges of stockbrokers are estimated using quarterly turnover on Australian stock exchanges as the indicator.

Volume estimates

14.262 Current price estimates of purchases of financial services (consisting of indirectly charged services of financial institutions, explicitly charged services provided by financial institutions, and taxes levied on financial transactions) by Australian residents in Australia are each revalued using the implicit price deflator derived from an output indicator used for volume estimates of the gross value added of the finance industry (see Chapter 24 for further details) and its current price counterpart. Current price estimates of sharebroking services are revalued by a share price index.

14.263 Current price estimates of purchases of financial services by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.264 Chain volume estimates of purchases of financial services are derived by aggregating the elemental volume components above.

12.3 + 12.4 Insurance and other financial services

Volume estimates

14.265 Chain volume estimates of purchases of insurance and other financial services are derived by aggregating the elemental volume components above.

12.5 Other goods and services

Description

14.266 As the name implies, the scope of this item is personal outlays on goods and services not included in the other categories. Also included is current expenditure of non-profit institutions serving households in spheres such as religion, philanthropy, scientific or other research, and industrial relations.

14.267 Examples are household expenditure on:

- dry cleaning and laundry services;
- removalists' services;
- professional services (other than health care services which are classified to HFCE on Health (06);
- domestic services rendered by housekeepers, cooks, gardeners, and child minders (but not by pre-schools, which are covered by HFCE on Education services (10));
- funeral services;
- advertising services;
- photographic services such as film processing and studio services;
- hire services for domestic items such as linen and washing machines (but hire of television sets and video cassette recorders is covered by HFCE on Cultural and entertainment services (09.4.2));
- repair and maintenance services not identified elsewhere; and
- services provided to students at post-secondary institutions by their sports and student unions.

14.268 Finally, this item covers the current expenditure of non-profit organisations serving households and not elsewhere covered, such as churches, charities, conservation groups, trade unions and professional associations.

Sources and methods

Personal outlays on miscellaneous services

14.269 The estimates of household expenditure on dry cleaning, child care, photographic services, domestic services, personal freight, personal advertising, and miscellaneous services have been benchmarked for 1988–89 and 1993–94 using data from the Household Expenditure Surveys. A variety of indicators is used to interpolate and extrapolate other annual and quarterly estimates.

14.270 For dry cleaning and laundering, the quarterly indicators are mean resident population and the dry cleaning subgroup of the CPI. The indicators for hire services are mean resident population and average weekly earnings.

Sources and methods continued

14.271 The estimates of household expenditure on child care services are benchmarked using *Child Care, Australia* (Cat. no. 4402.0), and interpolated and extrapolated using a combination of average weekly earnings and estimates of the number of children less than ten years old. The estimates of other domestic services are benchmarked using data on the wages of domestic servants and payments for other domestic services, and are moved forward using average weekly earnings and mean resident population.

14.272 An estimate is included for household expenditure on removalists' services, but it is based on partial information and is extrapolated using a variety of annual and quarterly indicators such as freight revenue of transport companies, and housing completions.

14.273 Expenditure on funerals is estimated using quarterly information about the number of deaths taken from *Australian Demographic Statistics* (Cat. no. 3101.0) together with an estimate of the average cost of a funeral.

14.274 Household expenditure on professional services other than health care services is estimated from total business income shown in Taxation Statistics. A percentage of business income of individuals, partnerships, trusts and companies from legal, accountancy, other business and community services is used to estimate household expenditure on professional services. In respect of 1994–95, 27 per cent of lawyers' income, 12 per cent of accountants' income, 0.02 per cent of other business income and 2.8 per cent of community services income were estimated to be derived from households.

14.275 Total expenditure on personal advertising is based on HES data and extrapolated using a composite indicator of mean population and average weekly earnings.

14.276 Household expenditure on photographic services is benchmarked on HES data and extrapolated using the CPI series for photographic services.

14.277 Miscellaneous services are based on HES estimates for hire of tools and hire of household durables, as well as miscellaneous services not included elsewhere. Average weekly earnings are used as an indicator series.

14.278 Repair and maintenance services not included elsewhere are based on HES estimates for service and repair of household equipment. Average weekly earnings are used as an indicator series.

Current expenditure of non-profit institutions

14.279 It is assumed that the current expenditure of non-profit institutions that receive most of their funds in the form of government grants (such as welfare services) is approximately equal to the value of the current income (grants and donations) they receive. Annual and quarterly information about grants paid to these institutions is available from the ABS Public Finance Section. Annual information about donations to charitable institutions claimed as tax deductions is available from Taxation Statistics.

Sources and methods continued

14.280 Non-profit institutions such as churches are mostly funded by unrequited transfers from households. Their compensation of employees is taken as the measure of their current expenditure. The benchmark is the product of the number of persons in religious orders (provided by the Census of Population and Housing) and an estimate of their average earnings. It is extrapolated using movements recorded in the Survey of Employment and Earnings for ANZSIC Group 961 Religious organisations as the indicator.

14.281 It is assumed that expenditure of trade unions and professional associations is equal to the value of the dues and membership fees they receive. This information is available annually from Taxation Statistics with a lag of about two years. Quarterly estimates are obtained by interpolation and extrapolation using a variety of broad activity indicators.

Volume estimates

14.282 Current price estimates of purchases of other services by Australian residents in Australia are revalued using the CPI and a combination of indexes from *Wage Cost Index* (Cat. no. 6345.0).

14.283 Current price estimates of purchases of other services by Australian residents overseas are revalued using a composite index of overseas CPIs.

14.284 Chain volume estimates of purchases of other services are derived by aggregating the elemental volume components of the above.

12.1 + 12.2 + 12.5 Other goods and services

Volume estimates

14.285 Chain volume estimates of other goods and services are derived by aggregating the elemental volume components for these subcategories.

Total 12: Miscellaneous goods and services

Volume estimates

14.286 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.

ADJUSTMENT FOR EXPENDITURE OVERSEAS LESS EXPENDITURE OF NON-RESIDENTS IN AUSTRALIA

Description

14.287 This item is included in HFCE COICOP items 01–12, which are discussed above, as an adjustment to each appropriate good or service so that total HFCE covers the expenditure only of resident households (in Australia and overseas). Thus expenditures by overseas visitors on fares, meals, accommodation, entertainment, recreation and other goods and services are deducted from the appropriate HFCE categories and expenditure by Australian residents abroad is added to each appropriate category. Calculation of net expenditure overseas is a two stage process. The first stage estimates the total value of net expenditure overseas. The second stage allocates expenditure to the appropriate HFCE category.

Description *continued*

14.288 As the name implies, this is a net item composed of two major subitems offset against each other. The first of these is Expenditure overseas by residents. It is composed of two balance of payments items:

- Personal travel debits; and
- Expenditure of Australian Government employees.

14.289 *Personal travel debits*, as adjusted for national accounting purposes, records the acquisition of goods and services abroad by residents travelling at their own expense (i.e. other than by business travellers, whose expenditure is largely intermediate consumption of the employing business). Examples are purchases of accommodation, meals, ground transportation and tours. Expenditure of Australian Government employees records the personal expenditure abroad on goods and services by Australian diplomats stationed abroad and by their dependants.

14.290 The second major subitem, *Expenditure of non-residents in Australia*, is also composed of two balance of payments items:

- Travel credits; and
- Expenditure of foreign government employees.

14.291 *Travel credits* records the acquisition of goods and services in Australia by all non-resident travellers. *Expenditure of foreign government employees* records the personal expenditure in Australia on goods and services by foreign diplomats and their dependants stationed in Australia.

Sources and methods

Expenditure overseas by residents

14.292 The estimates for personal travel debits are prepared by multiplying the number of residents travelling overseas for other than business purposes by their average expenditure. The number of travellers is derived monthly by averaging the numbers of short-term overseas departures and arrivals of non-business residents from *Overseas Arrivals and Departures, Australia* (Cat. no. 3401.0). The Survey of International Trade in Services (travel component) provides a quarterly measure of the per capita expenditure of Australian travellers abroad using credit cards, travellers' cheques, cruise fares and other prepaid packages. It is supplemented with data every four years from the Survey of Returned Australian Travellers, which provides a split between business and non-business traveller expenditures as well as information on the cash taken abroad by Australian travellers and other sources of travel finance such as from earnings abroad.

14.293 Expenditure of Australian Government employees is estimated using information from Commonwealth government records. The annual estimates are obtained by summing the quarterly estimates.

Expenditure of non-residents in Australia

14.294 The balance of payments item Travel credits comprises three components: business travel; education-related travel; and other personal travel. The first and third categories are estimated by multiplying the number of visitors in these categories by their average expenditure. The number of visitors is derived monthly by averaging the numbers of short-term non-education arrivals and departures of foreign visitors from *Overseas Arrivals and Departures, Australia* (Cat. no. 3401.0). Their average expenditure is estimated using a number of sources. First, data are compiled from the International Visitor Survey conducted on behalf of the Bureau of Tourism Research, which collects, from short-term visitors immediately prior to their departure, information about their travel expenditure in Australia. Second, the Australian landed content of prepaid package tours by non-resident travellers is estimated from a variety of sources including a former ABS survey of inbound tour operators. The annual estimates are the sum of the quarters.

14.295 Third, on-carriage receipts of Australian domestic airlines measures the revenue of resident airlines for carrying foreign travellers on international airline tickets for domestic transport legs beyond their initial arrival in Australia. Quarterly estimates are compiled directly from the Survey of International Trade in Services (transport component) and annual estimates are the sum of the quarters.

14.296 Fourth, the expenditure of foreign military crews is estimated from advice by the Department of Defence regarding Visiting Military Personnel, which provides quarterly data on the number of foreign service personnel visiting Australia, together with per capita expenditure data supplied irregularly by the United States Navy. Annual estimates are the sum of the quarters.

14.297 The education-related component of personal travel credits is expenditure of foreign visitors coming to Australia for the purposes of education. The Department of Education, Training and Youth Affairs (DETYA) provides calendar year estimates of the number of foreign students in Australia within the scope of its statistics and indicative per capita course fees per student registration. These estimates are combined with per capita goods and services expenditure of foreign students (derived from the DETYA Survey of International Students conducted in 1991–92, 1996–97 and 1999) to estimate the total expenditure of foreign students studying in Australia. Annual estimates are distributed to quarters using data from *Overseas Arrivals and Departures, Australia* (Cat. no. 3401.0) as an indicator of arrivals of visitors for the purpose of education in Australia.

14.298 Expenditure of foreign government employees is estimated using the diplomatic and consular lists for the number of foreign diplomats and the Household Expenditure Survey for an estimate of their personal expenditure. Diplomats are out of scope of the HES, but the assumption is made that their expenditure is similar to that of high-income Canberra households. Quarterly estimates are obtained by equally distributing the annual estimates.

Allocation of net expenditure overseas to HFCE category

14.299 Data on categories of expenditure by visitors to Australia are published by the Bureau of Tourism Research.

GOVERNMENT FINAL CONSUMPTION EXPENDITURE

Classification

14.300 The SNA93 proposes a classification of the functions of government which 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. The categories used in the classification of total outlays in accordance with the Classification of the Functions of Government (COFOG) 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

Description

14.301 Government final consumption expenditure 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. This output has no directly observable market value, and so it is valued in the national accounts at its cost of production.

14.302 Government final consumption expenditure 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.

14.303 An exception to the above definition is made for defence expenditure. Current defence expenditure includes 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. The ABS has followed international recommendations in applying this treatment. The justification for it has been that the durability of military hardware is uncertain because of wars and other conflicts. However, expenditure on military assets that can be used for civilian purposes, such as hospitals and dock facilities, is classified as gross fixed capital formation.

Description *continued*

14.304 Expenditure overseas on major items of military equipment with no equivalent civilian use is included in government final consumption expenditure in the period in which the equipment is delivered. The value of military equipment and facilities transferred to civilian use or as gifts to foreign countries is offset against expenditure on defence.

14.305 Government final consumption expenditure can be regarded as comprising the following:

	compensation of employees paid to employees of general government bodies (other than those 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.

14.306 Intermediate consumption for general government includes general government's share of the imputed financial services provided by banks and other financial intermediaries (FISIM). Detailed estimates of government final consumption expenditure classified by purpose are available, as a general rule, from 1961–62.

Universities

14.307 Public universities are treated as non-market NPIs allocated to the general government sector. However, the treatment of public universities has changed with the introduction of the SNA93. Universities have been shifted from the State and local level of general government to what is now termed the 'national' level.

14.308 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.

Universities continued

14.309 While there continue to be two subsectors within the general government sector defined according to their level of government, their definitions have changed. Whereas previously these subsectors were defined as (i) Commonwealth and (ii) State and local, they are now defined as (i) National and (ii) State and local. The previous subsector definitions presented problems when allocating institutional units such as public universities, which are subject to a degree of control from both the Commonwealth government and State governments. The scope of the new National subsector has been changed to include multi-jurisdictional units in addition to units which are solely under the jurisdiction of the Commonwealth. At present, universities are the only institutions to be designated as multi-jurisdictional units.

Sources and methods

Annual estimates

14.310 For Commonwealth and State general government, data are sourced from public account ledgers, budget papers, Auditors'-General Reports, and supplementary departmental documents. These data are coded using a standardised classification which allows unit records to be aggregated to national accounting totals.

14.311 For local government, an annual ABS questionnaire is used to collect data from local government authorities in some States, while in others the data are jointly collected through the Commonwealth Grants Commission or the Department of Local Government.

Quarterly estimates

14.312 Information about Commonwealth and State general government is mostly extracted 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. Additional information is collected quarterly from a number of general government non-budget enterprises. Estimates for local government are prepared from a quarterly sample of local government authorities.

Volume estimates of government final consumption expenditure

14.313 All of the components of government final consumption expenditure (GFCE) for each State, described below, are revalued to the prices of the previous year. They are summed to State and national totals and then chained to form chain volume estimates.

Volume estimates of government final consumption expenditure *continued*

14.314 Most of the services produced by the general government sector are not sold on the market, and therefore there are no values and prices associated with most outputs. Hence it has been the practice for GFCE at current prices to be revalued at the prices of the previous year using price indexes (i.e. deflators) relating to the inputs to the general government sector. The major input is labour, and public sector/industry wage rate indexes from *Wage Cost Index* (Cat. no. 6345.0) figure prominently in the deflators used. Intermediate inputs cover a wide range of goods and services, including electricity, paper and publishing, transport and office requisites. Detailed information obtained periodically from Commonwealth and State government departments is used to identify the significant components of intermediate input and provide the weights for combining them and the wage rate indexes together. The price indexes for components of intermediate input are taken from *Price Indexes of Articles Produced by Manufacturing Industry* (Cat. no. 6412.0), *Price Indexes of Materials Used in Manufacturing Industries* (Cat. no. 6411.0), *Consumer Price Index (Cat. no. 6401.0) and Import Price Index* (Cat. no. 6414.0).

14.315 There is one other input: consumption of fixed capital (COFC). Estimates of COFC for the nation in the prices of the previous year are derived using the perpetual inventory method (PIM)—see Chapter 16 for details. State estimates are derived by allocating the national estimates to each State in proportion to more approximate estimates derived from a simplified version of the PIM.

14.316 Commonwealth GFCE also includes various personal benefit payments (other than social assistance benefits). These are revalued to the prices of the previous year using price indexes relating to the services for which the payments are made.

Defence

14.317 Defence payments are revalued using a chain price index comprising wage rate indexes and price indexes relating to intermediate inputs and equipment. Detailed information is available of major purchases of military equipment, which allows the construction of a chain price index deflator.

14.318 The current price estimates of the defence adjustment are revalued using an import price index for other transport equipment.

14.319 COFC is derived using the PIM.

Commonwealth non-defence

14.320 COFC is derived using the PIM.

14.321 Current price estimates of redundancy payments in the previous year are extrapolated using public service employment numbers.

14.322 Current price estimates of medical personal benefit payments are revalued using a composite of price indexes derived from Medicare statistics reflecting doctors' service charges.

Commonwealth non-defence continued

14.323 Current price estimates of pharmaceutical benefit payments are revalued using the consumer price index for chemist goods.

14.324 Current price estimates of the cost of superannuation are revalued using the total public sector wage rates index.

14.325 The current price estimates of the remainder of Commonwealth non-defence GFCE are revalued using a price index comprising wage rate indexes and price indexes relating to intermediate inputs.

State and local

14.326 COFC is derived using the PIM.

14.327 Current price estimates of redundancy payments in the previous year are extrapolated using public service employment numbers.

14.328 The current price estimates of the remainder of State and local GFCE are revalued using a price index comprising wage rate indexes and price indexes relating to intermediate inputs.

EXPENDITURES ON INDIVIDUAL AND COLLECTIVE GOODS AND SERVICES

14.329 In the SNA93, final consumption expenditure is incurred only by general government, NPISHs and households. All of households' consumption expenditure is incurred on their own behalf. Consumption expenditure by general government, on the other hand, is either for the benefit of the community at large (collective consumption) or for the benefit of individual households. By convention, all consumption expenditure by NPISHs is treated as being for the benefit of individual households. This distinction between collective and individual consumption expenditure is of considerable importance in the system of national accounts. 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 and services

14.330 Individual goods and services are essentially 'private', as distinct from 'public' goods. 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.

Individual goods and services *continued*

14.331 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.

14.332 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

14.333 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 can be 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 as defined in paragraph 14.331);
- 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.

14.334 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

14.335 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 Ministries 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.

The classification of individual and collective government expenditures

14.336 COFOG (see paragraph 14.300) is a classification of transactions designed to apply to general government and its subsectors. This classification is 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

14.337 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 system

Non-market services to enterprises

14.338 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.

Non-market services to enterprises *continued*

14.339 Enterprises also benefit from a number of genuinely collective services such as the research and development undertaken by non-market producers, 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.

FINAL CONSUMPTION EXPENDITURE AND ACTUAL FINAL CONSUMPTION: SUMMARY

14.340 The purpose of this section is to summarise the conceptual interrelationship between the main consumption aggregates for the three sectors in which final consumption takes place, namely, the household sector, the NPISH sector and the general government sector. On a practical level, it may be noted that each of the aggregates, whether referring to consumption expenditure or actual final consumption, has to be derived from data on expenditures.

The expenditure aggregates

14.341 The main expenditure aggregates are as follows:

(a) Household final consumption expenditure consists of the expenditure, including imputed expenditure, incurred by resident households on individual consumption goods and services, including those sold to them at prices that are not economically significant.

(b) Final consumption expenditure of NPISHs consists of the expenditure, including imputed expenditure, incurred by resident NPISHs on individual consumption goods and services. The expenditures of NPISHs are currently included with the expenditure of households in ASNA.

(c) 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:

  (i) government expenditure on individual consumption goods and services; and

  (ii) government expenditure on collective consumption services.

Actual final consumption

14.342 NPISHs have no actual final consumption, and so actual final consumption is confined to households and general government.

Actual final consumption of households

14.343 This is measured by the value of all the individual consumption goods and services acquired by resident households. There are three sets of goods and services entering into household actual final consumption:

- those acquired through expenditure by households themselves: their value is given by item (a) in paragraph 14.341;
- those acquired as social transfers in kind from NPISHs: their value is given by item (b) in paragraph 14.341; and
- those acquired as social transfers in kind from general government: their value is given by item (c) (i) in paragraph 14.341.

Actual final consumption of general government

14.344 This is measured by the value of the collective consumption services provided to the community, or large sections of the community, by general government. Its value is given by item (c) (ii) in paragraph 14.341.

Total final consumption in the economy

14.345 Total final consumption in the economy may be viewed from two angles. It may be defined 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 serving households and general government units. Alternatively, it may be defined 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.

14.346 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.

CHAPTER 15 GROSS CAPITAL FORMATION

INTRODUCTION

15.1 Gross capital formation refers to the gross additions to national wealth that result from three categories of investment:

- gross fixed capital formation, measured by the total value of a producer's acquisitions, less disposals, of fixed assets during the accounting period;
- 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
- acquisitions less disposals of valuables.

15.2 Changes in inventories, as well as the data sources and methodology used in their estimation, are described in detail in Chapter 17.

15.3 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.

15.4 Amounts paid for non-produced, non-financial assets such as land, subsoil assets and intangible non-produced assets 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 gross fixed capital formation (see paragraphs 15.105 to 15.108 for more information on these expenditures). However, costs associated with the transfer of ownership of such assets are included in gross fixed capital formation.

15.5 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.

15.6 Gross fixed capital formation is made up of the outlays of producers on commodities which do not add to their inventories or enter into the intermediate consumption for the period. 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 gross fixed capital formation.

INTRODUCTION *continued*

15.7 The related concepts of gross and net capital stock, capital services and the consumption of fixed capital, as well as the data sources and methodology used in their estimation, are described in detail in Chapter 16.

BENCHMARKING TO SUPPLY AND USE TABLES

15.8 Of necessity, many independent data sources are used to compile estimates of capital formation: annual and periodic surveys of industries, sub-annual surveys of businesses across industries, Australian Taxation Office data, and ABS Government Finance data, are just some of the sources used. In many cases these collections are undertaken infrequently, so that in some years extrapolations have to be made using less complete data. National accountants also have to transform many of these source data onto a national accounts basis. They also have to make estimates using whatever data are available where no periodic or sub-annual survey or similar data are available. Of necessity, the national accounts make extensive use of methods based on benchmarks from which other indicator data are extrapolated. In a period of comparatively rapid change, extrapolative methods based on assumptions of fixed relationships become less reliable. In these circumstances there is a need to validate or confront the estimates that make up the national accounts.

15.9 The approach undertaken by the ABS, for years from 1994–95, is to confront estimates of final demand, including gross capital formation, with estimates of supply, within supply and use tables. Several improvements to the overall quality of capital formation estimates have resulted from this confrontation process.

GROSS FIXED CAPITAL FORMATION

15.10 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 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.

15.11 The acquisition of non-reproducible tangible assets such as land, subsoil assets and natural timber tracts is not included in gross fixed capital formation. 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.

15.12 Previously, outlays by the general government sector on durable goods for military use were excluded from gross fixed capital formation and included in government final consumption expenditure on the grounds that their future productive capacity was uncertain. SNA93 recommends that certain defence expenditure be treated instead as gross fixed capital formation. Expenditures to be treated in this way include construction of buildings, roads, bridges, airfields, docks, etc. for military use. Transport equipment, communications equipment and computers are also to be capitalised provided they are not part of weapons or weapons delivery systems. 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. Furthermore, they are used in a fashion similar to civilian assets and could conceivably be switched from military to civilian use. In some countries these facilities are used for both military and civilian purposes. Expenditures on weapons of destruction and weapon delivery systems continue to be regarded as government final consumption expenditure. This includes rockets, missiles, warheads (and their means of delivery), warships, submarines, fighter aircraft, bombers and tanks.

15.13 SNA93 recommends that livestock be included in gross fixed capital formation 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 to be capitalised; animals raised for food are to be treated as work-in-progress until slaughtered. This recommendation follows on from that in SNA68; however, it was not previously implemented in the ASNA. Australia's previous treatment was to include livestock in production only when slaughtered or exported live. SNA93 recommendations are now 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 that are slaughtered are added to the stock of finished goods when killed. 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.

15.14 Conventions have been adopted in the ASNA in areas where boundary problems arise. Some significant cases are as follows:

- Work put in place on structures (including dwellings, roads, dams, ports and other forms of construction) is considered to be gross fixed capital formation 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.
- Expenses associated with the transfer of real estate (real estate agents' commissions, lawyers' fees and government taxes and charges) are included in gross fixed capital formation.

15.15 Gross fixed capital formation is classified by type of asset. There is substantial diversity in the different types of gross fixed capital formation that may take place. A brief description of asset types used in the ASNA is presented below.

15.16 Acquisitions, less disposals, of new or existing tangible fixed assets, are subdivided by type of asset:

- *Dwellings* comprises houses and other dwellings (flats, home units, villa units, duplexes, mobile homes, caravans used as the principal residences of households, etc.). Expenditure on the construction of hostel-type accommodation, prisons and motels is included in Other buildings and structures.
- *Other buildings and structures* covers 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.
- *Machinery and equipment* includes vehicles; aircraft; ships; electrical apparatus; office equipment; furniture, fixtures and fittings not forming an integral part of buildings or structures; durable containers; special tooling, etc.
- *Cultivated assets* covers livestock (cattle and sheep) that are used repeatedly or continuously to produce products such as milk, wool etc., or are used as breeding stock. 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.

GROSS FIXED CAPITAL FORMATION *continued*

- *Ownership transfer costs* comprises 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. 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.

15.17 Acquisitions, less disposals, of new and existing intangible fixed assets are subdivided by type of asset:

- *Computer software* covers both purchased software and software developed in-house. Gross fixed capital formation 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.
- *Entertainment, literary or artistic originals* comprises 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.
- *Mineral exploration* comprises all mineral exploration expenditure, undertaken on land and in Australia's territorial waters and the continental shelf over which Australia exercises exclusive rights, regardless of whether or not the exploration was successful. Mineral exploration is undertaken in order to discover new deposits of minerals or fuels that may be exploited commercially. Expenditures included in gross fixed capital formation include the cost of test drilling and boring, aerial surveys and transportation costs.

PRIVATE GROSS FIXED CAPITAL FORMATION

Dwellings

15.18 Gross fixed capital formation in dwellings consists of the value of acquisitions of new and existing dwellings less the value of disposals of existing dwellings, 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. All dwellings, including houseboats, barges, mobile homes and caravans used as the principal residences of households, and any associated structures such as garages, are regarded as fixed assets.

Sources and methods—current price estimates

Annual estimates

15.19 Annual estimates are derived by aggregating the quarterly estimates.

Quarterly estimates

15.20 Estimates are primarily based on the value of work done during the period on new residential buildings and on alterations and additions to residential buildings. Both categories of expenditure are in scope of the quarterly Building Activity Survey. 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 gross fixed capital formation in dwellings by the public sector are sourced from the ABS's public finance statistics. Public expenditure (which also allows for net sales of existing dwellings to the private sector) is deducted from total gross fixed capital formation in dwellings to derive the correct value for the private sector. Derivation of public sector estimates is described in paragraphs 15.91 to 15.104.

15.21 Allowances are also added for net expenditure on new dwellings not included in the survey (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 architects' and other professional fees (but excluding ownership transfer costs).

15.22 The value of alterations and additions to existing dwellings is estimated using data from regular surveys of building activity, and from the periodic Household Expenditure Survey. The Building Activity Survey 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 Building Activity Survey, estimates from the survey are used only as an indicator to move forward benchmark estimates of expenditure on alterations and additions obtained from the Household Expenditure Survey.

Sources and methods—volume estimates

Annual estimates

15.23 Annual estimates are derived by aggregating the quarterly estimates.

Quarterly estimates

15.24 Current price estimates of gross fixed capital formation in 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. These estimates are then aggregated to form chain volume estimates for new and used dwellings and alterations and additions for Australia, and total dwellings for Australia and each State.

Sources and methods—volume estimates continued

(a) New and used dwellings

15.25 Current price estimates of gross fixed capital formation in private houses 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.

15.26 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* (Cat. no. 6416.0) for each State and Territory.

15.27 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* (Cat. no. 6416.0) for each State and Territory.

15.28 This dichotomy between contract-built and other types of dwelling construction is made to reflect the different lags between when prices are determined and when the work is done.

15.29 Current price estimates of gross fixed capital formation in other dwellings are deflated using State-specific price indexes, with each State index derived as a two quarter ending moving average of other dwelling price indexes for dwellings other than houses compiled by the ABS.

(b) Alterations and additions

15.30 Current price estimates of gross fixed capital formation in alterations and additions are deflated by applying a two quarter ending moving average of the Project Home Price Index from *House Price Indexes* (Cat. no. 6416.0) to the respective State current price estimates.

Other buildings and structures

15.31 Gross fixed capital formation in other buildings and structures consists of the value of acquisitions of new and existing non-dwelling buildings and structures less the value of disposals of existing non-dwelling buildings and structures, and the value of alterations and additions to existing non-dwelling buildings and structures.

Sources and methods—current price estimates

Annual estimates

15.32 Annual estimates for the total private sector are obtained by aggregating quarterly estimates. As the sources used to compile the total estimates of level do not contain any information by institutional sector or industry, sectoral dissections and estimates for individual industries are derived mainly using data from the quarterly Survey of Private New Capital Expenditure as an indicator. Because the survey only includes the value of new assets, adjustments are made to reflect net purchases of second-hand assets from the public sector.

Sources and methods—current price estimates continued

Quarterly estimates

15.33 Estimates are based primarily on the value of work done during the period on private non-residential buildings from the Building Activity Survey and the value of work done during the period on private non-building construction activity from the Engineering Construction Survey.

15.34 Adjustments are made to the basic source data to allow for the exclusion from the Building Activity Survey of non-residential building jobs with an approval value of less than $50,000 and architects' and other professional fees. A further adjustment is made to include buildings and structures on farms (which are not covered in these surveys). The estimates are also adjusted to reflect net purchases of second-hand assets from the public sector. Unlike the annual estimates, which are disaggregated by institutional sector and industry, quarterly estimates are compiled in total only.

15.35 Estimates for the most recent quarter are based on preliminary data from the Building Activity Survey and the Engineering Construction Survey.

Sources and methods—volume estimates

Annual estimates

15.36 Annual estimates are derived by aggregating the quarterly estimates.

Quarterly estimates

15.37 Current price estimates of gross fixed capital formation in other buildings and structures are deflated at the State level for each of new non-dwelling building, new engineering construction and net purchases of second-hand assets.

(a) New non-dwelling building

15.38 State-specific price indexes are derived as a three quarter ending moving average of non-dwelling building price indexes compiled by the ABS.

(b) New engineering construction

15.39 Current price estimates of gross fixed capital formation in new engineering construction are deflated using a composite of price indexes for roads, dams, sewerage, electricity infrastructure and telecommunications infrastructure. For all but roads construction, these price indexes are derived for Australia only.

15.40 Road construction price indexes are compiled by the ABS using data from a number of sources, but principally State road authorities.

Sources and methods—volume estimates continued

15.41 The dams and sewerage price index is a composite of relevant wage rates (*Wage Cost Index* (Cat. no. 6345.0)) and price indexes for equipment (*Price Index of Articles Produced by Manufacturing Industry* (Cat. no. 6412.0)), materials used in dams and sewerage construction (*Price Index of Materials Used in Building Other Than House Building* (Cat. no. 6407.0)) and motor vehicle operations (*Consumer Price Index* (Cat. no. 6401.0)).

15.42 The electrical facility construction price index is a composite of relevant wage rates (*Wage Cost Index* (Cat. no. 6345.0)) and price indexes for aluminium wires/cables, power transformers (*Price Index of Articles Produced by Manufacturing Industry* (Cat. no. 6412.0)) and electrical materials (*Price Index of Materials Used in Building Other Than House Building* (Cat. no. 6407.0)).

15.43 The telecommunications construction price index is a composite of relevant wage rates (*Wage Cost Index* (Cat. no. 6345.0)) and price indexes for recorded media, electronic equipment manufacturing and some other items of equipment (*Price Index of Articles Produced by Manufacturing Industry* (Cat. no. 6412.0)).

(c) Net purchases of second-hand assets

15.44 Current price estimates of gross fixed capital formation in net purchases of second-hand assets 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.

Machinery and equipment

15.45 Gross fixed capital formation in machinery and equipment by producers consists of the value of their acquisitions of new and existing machinery and equipment less the value of their disposals of their existing machinery and equipment. It covers transport equipment and other machinery and equipment, including office equipment, furniture, etc.

15.46 Gross fixed capital formation is not recorded until the ownership of the fixed assets is transferred to the unit that intends to use them in production. Thus, 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 gross fixed capital formation 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 gross fixed capital formation by the lessee, not the lessor.

Annual estimates

15.47 Prior to 1994–95, estimates are compiled using statistics of depreciable assets available from the Australian Taxation Office. Allowance is made for special taxation provisions applying 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. A further timing adjustment is made to account for those businesses that operate on a non-June financial year. An estimate is also made for 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. From 1994–95, the source of the data is the annual Economic Activity Survey (covering most of the large businesses) combined with data from the Australian Taxation Office (covering small businesses). These estimates are subject to adjustment as part of the data confrontation exercise which leads to balanced supply and use tables.

15.48 Data are compiled separately for companies, individuals (sole traders), and partnerships and trusts, by industry, thereby providing the basis of the institutional sector and industry estimates. As data reported to the Australian Taxation Office are on an industry of ownership basis, adjustments have to be made to accord with Australian Accounting Standard 17 (Accounting for Leases) which requires that assets be recorded on an industry of effective ownership (use) basis. At the total private enterprise level, adjustments are required to take account of the net effect of assets leased to or from the public sector. These adjustments are made using data on net assets acquired under finance lease agreements collected from individual public non-financial corporations and public financial corporations. 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 include data from the quarterly Survey of Private New Capital Expenditure and from *Lending Finance, Australia* (Cat. no. 5671.0). Because data on which to base the adjustments are not as detailed as would ideally be required, sector and industry estimates of gross fixed capital formation should be interpreted with caution.

Quarterly estimates

15.49 Quarterly estimates are interpolated between and extrapolated from the annual supply and use table benchmarks using a variety of indicators. The main source is the quarterly Survey of Private New Capital Expenditure. Adjustments are required to take account of industries out of scope of the survey and for net purchases of second-hand assets.

Sources and methods—current price estimates continued

15.50 As agriculture is out of scope of the Survey of Private New Capital Expenditure, alternative sources are used for this industry. Annual estimates based on taxation statistics, and supplemented by Agricultural Finance Survey data, are extrapolated and interpolated using various quarterly indicators. These consist of data on the numbers of tractors and similar self-propelled machinery sold for agricultural purposes from the Tractor Machinery Association, together with Australian Bureau of Agricultural and Resource Economics price indexes for new tractors sold. Estimates for other industries not in scope, such as the community services industry, are obtained by applying the average movements for the industries covered by the survey.

15.51 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 general government units. 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 Survey of Motor Vehicle Use and motor vehicle sales data available through the VFACTS service. Quarterly estimates are then interpolated and extrapolated according to new motor vehicle sales.

Sources and methods—volume estimates

Annual estimates

15.52 Annual estimates are derived by aggregating the quarterly estimates.

Quarterly estimates

15.53 Current price estimates of gross fixed capital formation in 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. These indexes are compiled in a multi-stage process:

- derive quarterly current price and chain volume estimates of the supply of capital goods split into six broad categories;
- derive implicit price deflators (IPDs) for each of the six categories;
- using an annual supply and use model, encompassing both the private and public sectors, impute estimates of gross fixed capital formation for each of the six broad categories for each institutional sector for each industry at the 1 digit level of ANZSIC (broad purpose category for general government);
- for each industry in the private sector, interpolate the annual imputations of gross fixed capital formation in each category by the total estimated quarterly supply of that category, to produce quarterly estimates of gross fixed capital formation for each industry for each of the six machinery and equipment categories; and
- use the IPDs for the six machinery and equipment categories from the second stage to deflate them.

Sources and methods—volume estimates continued

15.54 The six broad machinery and equipment categories are: road vehicles; other transport equipment; industrial machinery; computer equipment and peripherals; other electrical and electronic equipment; and other plant and equipment (includes furniture, furnishings, etc.). The supply of capital goods at a detailed commodity level is derived using quarterly recorded trade and manufacturing sales data benchmarked to more firmly based annual estimates. These are then deflated by appropriate price indexes from *Import Price Index* (Cat. no. 6414.0), *Price Indexes of Articles Produced by Manufacturing Industry* (Cat. no. 6412.0) and several price indexes from overseas, of which the most important is one for computer equipment compiled by the US Bureau of Economic Analysis. This is followed by aggregation to the six broad machinery and equipment categories and the derivation of their implicit price deflators.

Livestock

15.55 Gross fixed capital formation in livestock that are cultivated for the products they yield year after year (dairy cattle, draught animals, etc.) is measured by the value of acquisitions less disposals. It is therefore equal to 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 disposals. 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.

Sources and methods—current price estimates

Annual estimates

15.56 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. A primary source of data is the annual Agricultural Commodity Survey conducted by the ABS, which provides the number of animals in major livestock categories. Results from the survey are published in *Agriculture, Australia* (Cat. no. 7113.0). Calculation of sheep and cattle numbers also relies on slaughtering and exports data from *Livestock Products, Australia* (Cat. no. 7215.0). Data on acquisition and disposal prices of animals are more difficult to obtain and a wide range of sources is used, including industry publications and direct sources. Values for sheep and cattle are estimated by multiplying the number of animals by an average price per head.

Quarterly estimates

15.57 Quarterly estimates are derived by distributing the annual estimates equally across the quarters.

Sources and methods—volume estimates

Annual estimates

15.58 Annual volume estimates of gross fixed capital formation in the prices of the previous year are calculated by subtracting appropriately priced disposals from acquisitions. These estimates are then aggregated to form chain volume estimates of total livestock for each State and Australia.

Quarterly estimates

15.59 Quarterly volume estimates are derived by evenly distributing the annual estimates across the quarters.

Intangible fixed assets

15.60 SNA93 describes the production of books, recordings, films, software, tapes, disks, etc. 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. The output of the first stage is the original itself, over which ownership can be established by copyright, patent or secrecy. The value of the original depends on the actual or expected receipts from the sale or use of copies at the second stage.

15.61 The output of the first stage is an intangible fixed asset that belongs to the producer of the original (author, film company, program writer, etc.). It may be produced for sale or for own-account gross fixed capital formation by the original producer. As the asset may be sold to another institutional unit the owner of the asset at any given time need not be the original producer, although they are often one and the same unit. 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 value.

15.62 The owner of the asset may use it directly or to produce copies in subsequent periods. Typically the owner of the asset does one or more of three things in subsequent periods:

- The owner uses the asset directly, e.g. musical performances.
- The owner produces copies of the asset and sells them. If a copy is purchased for use in production for more than one year, then it is reported as gross fixed capital formation of an intangible fixed asset by the purchaser, e.g. most computer software. Otherwise the purchase of a copy is treated as consumption.
- The owner may also license other producers to make use of the original in production. The latter may produce and sell copies, or use copies in other ways, e.g. for film or music performances. In these cases, the owner is treated as providing services to the licensees that are recorded as part of their intermediate consumption. The payments made by the licensees may be described in various ways, such as fees, commissions or royalties but, irrespective of how they are described, they are treated as payments for services rendered by the owner.

(a) Computer software

15.63 Computer software that an enterprise expects to use in production for more than one year is treated as an intangible fixed asset. Such software may be developed in-house or purchased on the market. Software purchased on the market includes both software products purchased 'off the shelf' and customised software designed by a specialist for a specific customer. Acquisitions of such software are treated as gross fixed capital formation. Software purchased on the market is valued at purchasers' prices, 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.

15.64 Gross fixed capital formation in software also includes the purchase or development of large databases that the enterprise expects to use in production over a period of time of more than one year. These databases are valued in the same way as software, described above.

Sources and methods—current price estimates

Annual estimates

15.65 For 1997–98 and subsequent years, data for capital formation in computer software by private and public corporations are available from the annual Economic Activity Survey (EAS). The annual EAS collects data on total computer software expensed and capitalised. Some of the expenditure on software that is reported as being expensed is allocated to capital formation and the remainder is allocated to repair and maintenance (i.e. intermediate input). In addition, some of the reported expenditure on contractors, etc is allocated to capital formation in computer software.

15.66 For earlier periods, estimates of gross fixed capital formation in customised software and computer software developed in-house by private and public corporations are derived using *Business Use of Information Technology, 1993–94* (Cat. no. 8129.0) as the benchmark and backcast to 1979–80 using a collection run by Statistics Canada as no Australian data sources are available for this period. The Software Development and Computer Service Industry Survey has been run by Statistics Canada since 1979–80, and provides a history of revenue earned in respect of 'custom software development' and 'contract programming'. Prior to 1978–79, it is assumed that customised software and computer software developed in-house grew at an even rate, starting at zero in 1959–60.

15.67 For periods prior to 1997–98, estimates of gross fixed capital formation in software purchased 'off the shelf' by private and public corporations are derived using data from *Information Technology, 1995–96* (Cat. no. 8126.0) as the benchmark and backcast to 1989–90 using imports of computer software as an indicator. Prior to 1989–90 imports of software are not separately available, so imports of computer equipment (as published in a special article 'Imports of Computer Equipment' in the March quarter 1989 issue of *Australian National Accounts: National Income, Expenditure and Product* (Cat. no. 5206.0)), are used as an indicator for the period 1978–79 to 1988–89. For earlier periods, it is assumed that expenditure on 'off the shelf' software grew at an even rate, starting at zero in 1959–60.

Sources and methods—current price estimates continued

15.68 For 1997–98 and subsequent years, estimates of customised software plus computer software developed in-house on the one hand and estimates of computer software purchased 'off the shelf' on the other are carried forward from the benchmarks described above, but are constrained to sum to the estimates obtained from EAS. The indicators used to move the benchmarks forward are the same indicators used to derive quarterly estimates, described below.

15.69 Gross fixed capital formation in computer software for each industry is estimated using the industry proportions in *Business Use of Information Technology, 1993–94* (Cat. no. 8129.0), adjusted to include the agriculture, forestry and fishing industry, as this industry is not covered. It is assumed that software use by farm units is likely to be more consistent with use in those industries that are not intensive users of software.

Quarterly estimates

15.70 Quarterly estimates are derived by interpolating between and extrapolating from the annual estimates as follows:

- computer software developed in-house plus purchases of customised software are derived using linear trend methodology (see Appendix 6); and
- computer software purchased 'off the shelf' are derived using imports of computer software as an indicator.

Sources and methods—volume estimates

Annual estimates

15.71 Annual estimates are derived by aggregating the quarterly estimates.

Quarterly estimates

15.72 Current price estimates of gross fixed capital formation in computer software are deflated using a price index which declines by 6% a year. This rate of decline was determined by Statistics Canada after observing the trend of software prices over time for popular PC software.

(b) Entertainment, literary or artistic originals

15.73 This item covers the production of originals of: films; television programs; music products; and books. Separate estimates are prepared for each of these categories.

Sources and methods—current price estimates

Annual estimates

15.74 Annual estimates are derived as follows:

- *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 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 Film and Video Production and Distribution, 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 were 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 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.

Sources and methods—current price estimates continued

- *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 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).

Quarterly estimates

15.75 Quarterly estimates for film, television and recorded music are interpolated and extrapolated from the annual estimates using linear trend methodology. Quarterly estimates for recorded music and literary works are based on seasonal sales weights.

Sources and methods—volume estimates

Annual estimates

15.76 Annual estimates are derived by aggregating the quarterly estimates.

Quarterly estimates

15.77 Current price estimates of gross fixed capital formation in entertainment, literacy or artistic originals are deflated as follows:

- *Film and television:* current price estimates of gross fixed capital formation in film and television originals are deflated using a price index for entertainment services (Consumer Price Index (Cat. no. 6401.0)) as the future revenue/royalty streams are likely to be driven by box office sales.
- *Music originals:* current price estimates of gross fixed capital formation in music originals are deflated using the price indexes for records and cassettes (*Price Index of Articles Produced by Manufacturing Industry* (Cat. no. 6412.0)).
- *Literary works*: current price estimates of gross fixed capital formation in literary originals are deflated using the CPI component index for books, newspapers and magazines (*Consumer Price Index* (Cat. no. 6401.0)), as the future revenue/royalty streams are likely to be driven by book sales.

(c) Mineral exploration

15.78 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.

15.79 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). 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.

Sources and methods—current price estimates

Annual estimates

15.80 Data on mineral exploration expenditure from 1965–66 was obtained from *Mineral and Petroleum Exploration, Australia* (Cat. no. 8412.0.). Data for expenditure on successful bids for offshore petroleum leases were obtained from the Department of Industry, Science and Resources. 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.

Quarterly estimates

15.81 Quarterly estimates are based on data from *Mineral and Petroleum Exploration, Australia* (Cat. no. 8412.0.).

Sources and methods—volume estimates

Annual estimates

15.82 Annual estimates are derived by aggregating the quarterly estimates.

Quarterly estimates

15.83 Current price estimates of gross fixed capital formation in mineral and petroleum exploration are deflated using a composite price index of mining wage rates (*Wage Cost Index* (Cat. no. 6345.0)) and price indexes 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 (*Price Index of Articles Produced by Manufacturing Industry* (Cat. no. 6412.0)).

Ownership transfer costs

15.84 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:

- 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, other buildings and structures, and unoccupied land.

Sources and methods—current price estimates

Annual estimates

15.85 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), and *Legal and Accounting Services, Australia* (Cat. no. 8678.0). 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 ratios are applied to taxation statistics of total business income. 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. 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. As taxation statistics are not finalised until about two years after the reference period, estimates for the latest two years are generally based on the quarterly indicators mentioned below.

15.86 Stamp duties estimates are based on data obtained from the various State stamp duty offices. 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.

Quarterly estimates

15.87 Quarterly estimates for the 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. Periodic changes in scheduled fees are taken into account as well as changes in average charges from the declining rate schedules that generally apply. Data on the number of transactions and average sale prices are obtained from State Titles Offices and Valuers'-General Departments.

15.88 Stamp duties estimates are based on quarterly data from each State government. Titles Office and local government charges are estimated from the number of transactions occurring in each quarter.

Sources and methods—volume estimates

Annual estimates

15.89 Annual estimates are derived by aggregating the quarterly estimates.

Quarterly estimates

15.90 Volume estimates of 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.

Public corporations

15.91 Public corporations are generally corporations in which Australian governments own a majority of the shares. If Australian governments reduce their shareholding to become minority shareholders then the corporation is regarded as a private corporation from that time on.

Annual estimates

15.92 Estimates for the public non-financial corporations (including public marketing boards) component are compiled from a number of sources. The main ones are financial statements attached to Annual Reports of public non-financial corporations, Auditors'-General Reports, a joint ABS/Commonwealth Grants Commission Collection from each local government authority, and the annual Economic Activity Survey collecting computer software data (see paragraphs 15.63 to 15.70 for more information on this capital formation). The extracted data are coded using a standard classification framework which allows data for individual units to be aggregated to the required levels. Gross fixed capital formation is classified according to type of asset (dwellings, non-dwelling building, engineering construction, machinery and equipment, and computer software), industry and purpose. Because of delays in the receipt of data, estimates for the latest year are based on quarterly sources. Estimates for public financial corporations are derived from an annual collection from each of the corporations.

Quarterly estimates

15.93 Estimates are based on a quarterly collection covering all significant public corporations and a sample survey of local government authorities. There is no quarterly asset dissection.

General government

Annual estimates

15.94 For Commonwealth and State general government, data are extracted from administrative by-product sources such as financial statements prepared by the Minister for Finance, Commonwealth and State Budget Papers and Auditors'-General Reports, Commonwealth Department of Finance and Administration ledgers and supplementary departmental documents, and by direct collection from general government units. The extracted data are coded using a standardised classification framework which allows data for individual units to be aggregated to the required level. Gross fixed capital formation transactions are classified by type of asset and purpose.

15.95 A joint ABS/Commonwealth Grants Commission annual return on capital formation is collected from each local government authority in Australia.

General government continued

15.96 Estimates of gross fixed capital formation in computer software by general government units are separately derived using *Government Use of Information Technology, 1997–98* (Cat. no. 8119.0) as the benchmark and extrapolated using data sourced from the ABS's public finance statistics. Prior to 1997–98, estimates are based on a survey of general government expenditure in respect of 1994–95, after adjusting for non-response and undercoverage, and backcast to 1989–90 using imports of computer software as an indicator. For the period 1978–79 to 1988–89, imports of software are not separately available, so imports of computer equipment (as published in a special article 'Imports of Computer Equipment' in the March quarter 1989 issue of *Australian National Accounts: National Income, Expenditure and Product* (Cat. no. 5206.0)), are used as an indicator. Prior to 1977–78, it is assumed that general government expenditure grew at an even rate, starting at zero in 1959–60.

Quarterly estimates

15.97 For Commonwealth and State general government, data are extracted from administrative by-product sources such as the Commonwealth Department of Finance and Administration quarterly ledger, and State government monthly and quarterly statements of receipts and expenditure. Data are also obtained from a quarterly sample of general government non-budget units. Data for local government are obtained from a quarterly sample covering about 20 per cent of the authorities. There is no quarterly asset dissection.

Sources and methods—volume estimates

Annual estimates

15.98 Annual current price estimates of gross fixed capital formation in dwellings, non-dwelling construction, computer software, and a six-way dissection of machinery and equipment are separately deflated for each institutional sector by industry (1 digit ANZSIC) for public corporations and by broad purpose category for general government. In addition, for general government, national—other, estimates of gross fixed capital formation in mineral exploration and intangible fixed assets—film and television are deflated using the same price indexes used to deflate private gross fixed capital formation in these items. The single deflator for dwellings is the implicit price deflator for private gross fixed capital formation in dwellings. For non-dwelling construction there is a single deflator for each institutional sector which is derived as an implicit price deflator in the following multi-stage process:

- annual current price estimates of public gross fixed capital formation in non-dwelling building and engineering construction by institutional sector by State are interpolated using a mathematical procedure to produce quarterly estimates;
- these quarterly current price estimates are deflated using the same State-specific price indexes for non-dwelling building used to deflate private gross fixed capital formation, but for engineering construction public sector State-specific price indexes are used (they share the same elemental price indexes as used for the private sector but are weighted differently); and

- aggregate annual chain volume estimates of non-dwelling building and engineering construction combined are derived for each institutional sector and divided into the corresponding current price estimates to produce the implicit price deflators.

The deflators used for computer software and the six broad categories of machinery and equipment are the same as those used for private gross fixed capital formation.

Quarterly estimates

15.99 In general, the elemental price indexes used to deflate public gross fixed capital formation are the same as those used to deflate private gross fixed capital formation. The difference lies in the level of disaggregation at which the deflation is done and some complications with public gross fixed capital formation. In terms of asset dissection, the deflation of public gross fixed capital formation is done at a higher level of aggregation than is the case for private gross fixed capital formation, but public gross fixed capital formation has a sectoral dimension whereas private gross fixed capital formation does not.

15.100 Quarterly current price estimates of public gross fixed capital formation are deflated at the State level according to type of asset (new construction and equipment; net purchases of second hand assets; and computer software) for each of the following institutional sectors:

- general government, national—other;
- general government, national—defence;
- general government, State and local;
- public corporations, Commonwealth; and
- public corporations, State and local.

In addition, quarterly estimates of mineral exploration and intangible fixed assets—film and television are deflated at the State level for general government, national—other.

15.101 Current price estimates of net purchases of second hand assets, computer software, mineral exploration and intangible fixed assets—film and television are subtracted from total public gross fixed capital formation for each sector for each State to obtain estimates of total new expenditures on public construction, machinery and equipment. The latter are deflated at the State level using State-specific chain price indexes for the aggregate of new dwellings, new non-dwelling building, new engineering construction and new machinery and equipment. These chain price indexes are derived as follows:

- for each institutional sector for each State the annual current price estimates of expenditures on new dwellings, new non-dwelling building, new engineering construction and six-way dissection of machinery and equipment are divided by four to obtain quarterly figures, which are extended by three quarters into the latest year. These data are then deflated by the same price indexes used in the deflation of private gross fixed capital formation; and
- chain volume estimates are formed for each State by sector aggregate and divided into the corresponding current price estimates to form (implicit price deflators) the required chain price indexes.

15.102 Current price estimates of public gross fixed capital formation in computer software, like the estimates for the private sector, are deflated using a price index which declines by 6 per cent a year. Gross fixed capital formation in mineral exploration and intangible fixed assets - film and television are only identified for general government, national - other. The current price estimates are deflated by the same price indexes used in the deflation of private gross fixed capital formation.

15.103 The sale of used assets between the public and private sectors frequently involves very large transactions. In order to ensure that these transactions are exactly offsetting in chain volume terms, the implicit price deflator for total net second hand purchases by the private sector for each State is used to deflate the corresponding current price public sector net second hand sales series for that State.

15.104 Asset sales by the public sector to the private sector are frequently so large that they lead to negative gross fixed capital formation for the quarter in which they occur for the vendor State institutional sector. Alternating positive and negative numbers are inimical to the chaining method used by the ABS, and so the quarterly chain volume estimates of public sector net expenditures on used assets are simply added to the chain volume estimates of purchases of new fixed assets.

ACQUISITIONS LESS DISPOSALS OF NON-PRODUCED NON-FINANCIAL ASSETS

Description

15.105 This component covers purchases less sales of land, subsoil assets and intangible non-produced assets such as patented entities, leases or other transferable contracts and purchased goodwill. At present though, estimates of the value of purchased goodwill are not compiled for the Australian system of national accounts. As mentioned in paragraph 15.4, such purchases are regarded as capital in nature and, therefore, are included in relevant capital accounts, but they do not form part of gross fixed capital formation. Land is defined to include the soil covering and associated surface water. 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.

15.106 In principle, where transactions in residential and non-residential buildings occur, the land component should be reported separately from the building component but, in practice, the total sales value is recorded as gross fixed capital formation. The value of transfer costs involved in the transaction (such as stamp duties, agents' commissions and lawyers' fees) is included in gross fixed capital formation. Because of the lack of available data, estimates for the purchase of land, subsoil assets and intangible non-produced assets (net) in the ASNA represent only those transactions identified in the accounts of non-residents, general government and public corporations. The net purchases of land, subsoil assets and intangible non-produced assets 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 estimates

15.107 Estimates for public authorities are obtained from the ABS's public finance statistics. 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 Administration ledgers. For local government, a joint ABS/Commonwealth Grants Commission annual return is collected from each local government authority. Estimates for public non-financial corporations and selected marketing authorities are based on annual financial statements and Auditors'-General Reports. Estimates for public financial corporations are compiled from data collected by the ABS in the annual Survey of Expenditure on Fixed Assets. As indicated in the previous paragraph, the net purchases of land, subsoil assets and intangible non-produced assets by general government 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
continued

Quarterly estimates

15.108 Quarterly estimates for this component for domestic sectors are not published in the quarterly national accounts publication (Cat. no. 5206.0). However, acquisitions less disposals of non-produced non-financial assets by non-residents are recorded in the external account and the national capital account. The series is obtained directly from balance of payments statistics.

CHAPTER 16 CAPITAL STOCK AND CONSUMPTION OF FIXED CAPITAL

INTRODUCTION

16.1 The ABS has made comprehensive changes to its capital stock estimates in recent years. Major changes include the full integration of capital stock and multifactor productivity (MFP) measures, more detailed asset lives for machinery and equipment, implementation of chain volume measures, and the inclusion of certain fixed intangible and cultivated assets.

16.2 Estimates of the capital stock of the Australian economy, together with the value of capital assets used up in the productive process (called depreciation or consumption of fixed capital) and the flow of capital services to the productive process, are produced using an application of the perpetual inventory method (PIM). Estimates of capital stock and capital consumption are calculated for all fixed assets, tangible and intangible, that are owned by producers. These measures are expressed in current prices and also as chain volume measures.

16.3 Capital stock measures are discussed in detail in the ABS Occasional Paper: *Estimates of Depreciation and Capital Stock*, Australia by R. Walters and R. Dippelsman (1985/3). Despite the major changes that have been introduced since this paper was written, it is still a valuable source of information, e.g. the estimation of detailed estimates of gross fixed capital formation prior to 1948–49 and the derivation of asset lives. The upgraded capital stock estimates are also discussed in a feature article 'Upgrade of Capital Stock and Multifactor Productivity Estimates' in the 1997–98 issue of *Australian System of National Accounts* (Cat. no. 5204.0).

CONCEPTS

Capital stock

16.4 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.

- 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.
- *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.

Capital stock *continued*

- *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

16.5 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 (see Chapter 27).

16.6 The scope of capital stock is defined by the coverage of gross fixed capital formation (see Chapter 15).

Consumption of fixed capital and capital services

16.7 Two flow concepts are relevant to capital stocks: consumption of fixed capital and capital services.

- *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.

Consumption of fixed capital and capital services *continued*

- 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

16.8 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. That is, 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

16.9 Capital stock and consumption of fixed capital are presented in the Australian national accounts in current prices and as chain volume measures. The chain volume measures are referenced to the average values in the reference year, which is chosen to be the latest base year.

Capital stock measurement

16.10 There are two broad approaches to the measurement of capital stock: direct measurement and the perpetual inventory method (PIM).

16.11 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.

16.12 The 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);

Capital stock measurement *continued*

- 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

16.13 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.

16.14 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.

16.15 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.

16.16 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.

Obsolescence and consumption of fixed capital *continued*

16.17 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.

16.18 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

16.19 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). That is, the efficiency of the asset declines by small amounts at first and the rate of decline increases as the asset ages.

16.20 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.

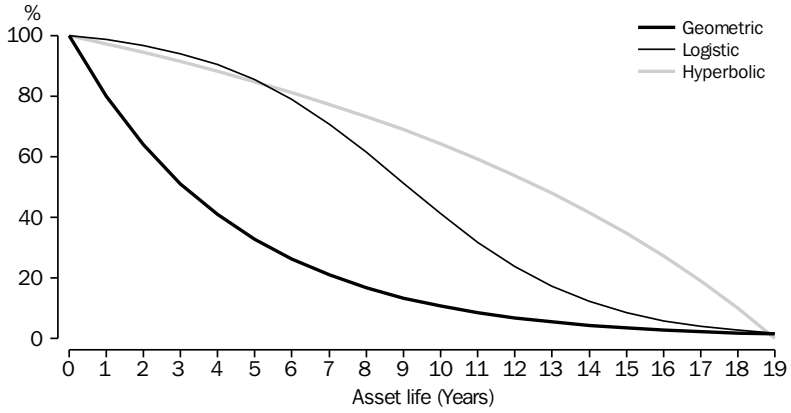
b is the efficiency reduction parameter.

Age-efficiency functions continued

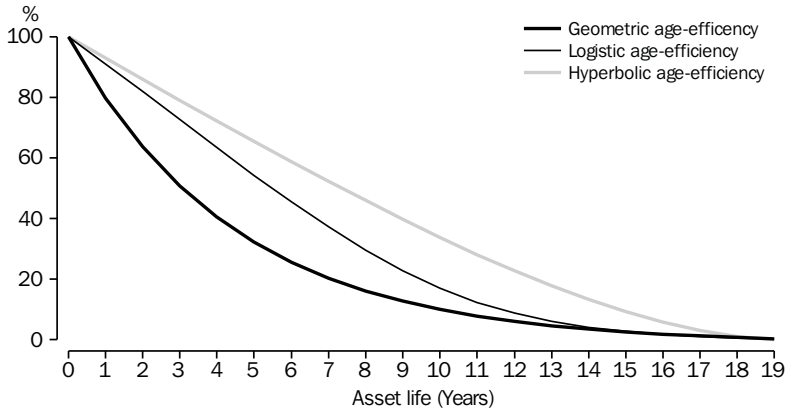
16.21 The efficiency reduction parameter b is set to 0.5 for machinery and equipment, and 0.75 for structures—the same parameter values as used by the BLS. The higher value for other buildings and structures redistributes efficiency decline to occur later in the asset's life, relative to machinery and 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, as mentioned in paragraph 16.19, 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.

16.22 Graphs 16.1 and 16.2 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.

16.1 AGE-EFFICIENCY FUNCTIONS



16.2 AGE-PRICE FUNCTIONS



Age-price functions

16.23 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 BLS and which approximates the average real 10 year Australian bond rate.

16.24 When the net present values of the different assets are aggregated for a particular period, they form the net capital stock for that period.

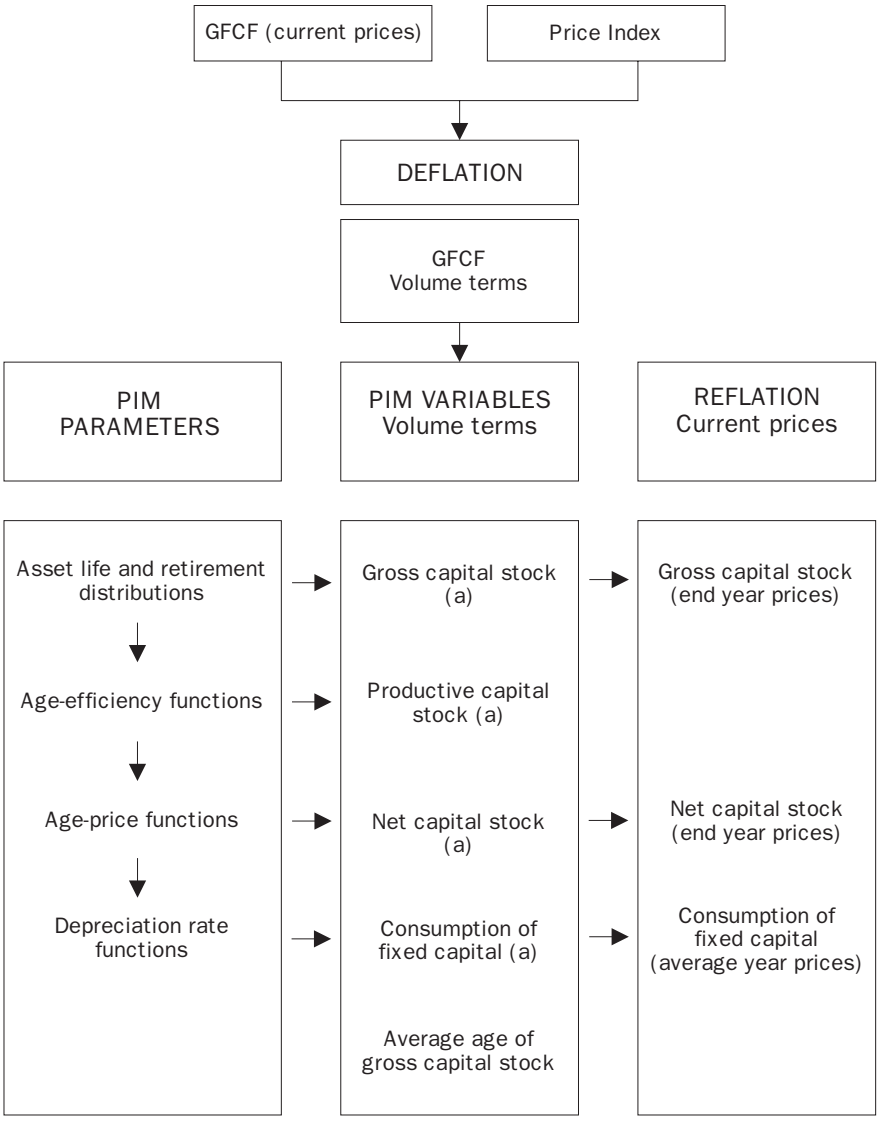
Depreciation rate functions

16.25 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).

The perpetual inventory method (PIM)

16.26 The steps involved in applying the PIM are summarised in diagram 16.3 below.

16.3 THE PIM PROCESS



(a) Expressed in the average prices of the reference year

The perpetual inventory method (PIM) *continued*

16.27 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.

16.28 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. However, 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.

16.29 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.

16.30 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.

16.31 Consumption of fixed capital 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.

The perpetual inventory method (PIM) *continued*

16.32 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:

$$GKS_t = GKS_{t-1} + GFCG_t - R_t$$

$$NKS_t = NKS_{t-1} + GFCF_t - CC_t$$

$$GKS\$_t = (GKS_{t-1} + GFCF_t - R_t) * (PI_t + PI_{t+1}) / 2$$

$$NKS\$_t = (NKS_{t-1} + GFCF_t - CC_t) * (PI_t + PI_{t+1}) / 2$$

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
- CC_t = deflated capital consumption in period t
- PI_t = price index in period t
- $ denotes the current dollar equivalent of the respective deflated series.

16.33 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 gross fixed capital formation (GFCF)

16.34 The GFCF data required as input into the PIM are consistent with those published in Cat. no. 5204.0. A detailed description of definitions, sources and methods used for these estimates is presented in Chapter 15. The discussion is briefly reiterated in this section, and extended to include industry and institutional sector details.

16.35 GFCF data by asset type (dwellings, other buildings and structures, machinery and equipment, livestock, computer software, mineral exploration and entertainment, literary or artistic originals, and ownership transfer costs), are further subdivided by institutional sector and industry/purpose.

Current price gross fixed capital formation (GFCF) *continued*

16.36 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 gross fixed capital formation 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 major data source used to dissect private gross fixed capital formation on other buildings and structures into institutional sectors and industries excludes transactions in second-hand assets.

16.37 The first years for which estimates of capital stock and consumption of fixed capital 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 now compiled from 1959–60 since the advent of SNA93, 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 which applies to that series.

16.38 Estimates of gross fixed capital formation 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.

16.39 Estimates for years prior to 1948–49 are prepared using various sources including Butlin[1], 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.

16.40 The construction of historical estimates, by asset type, is discussed in detail in Chapter 22 of the previous edition of this publication (Cat. no. 5216.0).

16.41 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.

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1 Butlin N. G., *Australian Domestic Product, Investment and Foreign Borrowing*, 1861—1938/39, Cambridge 1962.

Machinery and equipment

16.42 Data on gross fixed capital formation for machinery and equipment are broken down by kind of economic activity, at the ANZSIC Division level, and into six major classes of machinery and equipment, namely:

- computers and peripherals;
- electrical and electronic equipment;
- industrial machinery and equipment;
- road vehicles;
- other transport equipment; and
- other plant and equipment.

16.43 Gross fixed capital formation on each of the six classes of machinery and equipment is estimated for each industry (or purpose category in the case of general government) in each institutional sector. The estimation procedure has two stages. In the first stage various data sources are used to make initial estimates of the breakdown of equipment expenditure for each industry in each sector. Chief among the data sources are the Survey of Private New Capital Expenditure (SPNCE) during 1997 for the above six categories, a survey of private new capital expenditure by detailed category in respect of 1987–88, data for the six categories from the Economic Activity Survey (which covers the whole economy except the general government sector) for every year from 1998–99, a survey of general government capital formation for the six categories in respect of 1994–95, quarterly estimates of the supply of imported and domestically-produced capital goods, and from 1994–95 the annual supply and use tables. In the second stage the initial estimates are adjusted to ensure consistency with both annual GFCF totals and total supply of the six categories of machinery and equipment. The adjustment is done using the RAS procedure (a residual allocation system—see Chapter 12 for further details).

16.44 In the case of computers and peripherals it has been assumed that there is no expenditure on this class of equipment before 1960, and that expenditure on computers rose gradually after that time until the first data observation for imports in 1978–79.

Livestock

16.45 Estimates of the value of sheep and cattle that are used repeatedly or continuously to produce products such as milk and wool, or are used as breeding stock, are included in gross fixed capital formation. The scope of livestock and its data sources are discussed in more detail in Chapter 15. The main source of data on volumes is the ABS annual agricultural census, the results of which are published in *Agriculture, Australia* (Cat. no. 7113.0). Calculation of sheep and cattle numbers also relies on slaughtering and exports data from *Livestock Products, Australia* (Cat. no. 7215.0). Data on prices of animals are more difficult to obtain and a wide range of sources, including industry publications and direct sources are used.

Livestock continued

16.46 Livestock capital formation is recorded in the Agriculture, forestry and fishing industry. The institutional split is based on information obtained from the Australian Taxation Office and counts of agricultural business units from the ABS Business Register. Based on these sources, the estimated allocation of GFCF for livestock is 90 per cent to households and 10 per cent to non-financial corporations.

Intangible fixed assets

Mineral exploration

16.47 Mineral exploration covers expenditure on exploration for petroleum, metallic minerals, construction materials, gemstones, and other non-metallic minerals, but not expenditure on successful bids for offshore petroleum leases. The scope of exploration activity in Australia is further discussed in Chapter 15. Data on mineral exploration expenditure are obtained from *Mineral and Petroleum Exploration, Australia* (Cat. no. 8412.0), while data for expenditure on successful bids for offshore petroleum leases are obtained from the Department of Industry, Science and Resources. The latter data are subtracted from the former. Data on exploration by commodity (other than for petroleum) for the period 1948–49 to 1965 are largely based on data compiled by the Bureau of Resource Sciences.

16.48 Mineral exploration is confined to the Mining industry. Sectoral information is obtained from *Mineral and Petroleum Exploration, Australia* (Cat. no. 8412.0). GFCF is primarily allocated to non-financial corporations, although a small amount of exploration activity is also attributed to the general government sector and unincorporated enterprises.

Computer software

16.49 Estimates for the three components of computer software gross fixed capital formation, namely software developed in-house, purchases of customised software, and purchased 'off the shelf' software, are described in more detail in Chapter 15.

16.50 For 1997–98 and subsequent years, data for capital formation in computer software by private and public corporations are available from the annual Economic Activity Survey (EAS), after adjusting for expenditure relating to the repair and maintenance of computer software and expenditure on contractors. Estimates of GFCF for the latest year are extrapolated using imports of computer software for 'off the shelf' software and by linear trend extrapolation for the remainder.

16.51 Capital formation in computer software by general government units are derived using *Government Use of Information Technology, 1997–98* (Cat. no. 8119.0) as the benchmark and extrapolated using data sourced from the ABS's public finance statistics.

16.52 Gross fixed capital formation in computer software for each industry is estimated using the industry proportions in *Business Use of Information Technology, 1993–94* (Cat. no. 8129.0), adjusted to include the agriculture, forestry and fishing industry, as this industry is not covered. It is assumed that software use by farm units is likely to be more consistent with use in those industries that are not intensive users of software.

Intangible fixed assets continued

Entertainment, literary or artistic originals

16.53 This item covers the production of originals of: films; television programs, both by television stations (own-account) and independent producers; music products, both by recording companies and music publishers; and books by publishers. Separate estimates are prepared for Film and independent television, Television (own-account), Music record companies, Music publishing, and Literary works. The scope of these items, along with their data sources, is described in more detail in Chapter 15.

16.54 Artistic originals are confined to the cultural and recreational services industry. For music originals, all GFCF is allocated to non-financial corporations. The sectoral split for film and television is based on assumptions about who holds the copyright and receives the flow of income which the relevant film or television show produces over subsequent periods. In the 1970s most feature films were funded through government agencies such as the Australian Film Commission, the NSW Film Corporation, the South Australian Film Corporation and the Victorian Film Corporation, with a small number fully financed by distributors. Hence a very high proportion of total receipts has been attributed to the government sector.

16.55 In the 1980s almost all features and independent TV drama were funded using private and largely 'non-industry' finance raised under 10BA tax incentive scheme, with 'top up' finance provided by government film agencies. Initially, the scheme allowed operators to claim a 150 per cent tax deduction for any money invested and to pay tax on only half of any income earned from the investment. However, the level of deductions and income exemptions has been progressively reduced. Accordingly, it has been assumed that over this period the government share of receipts fell during implementation of the scheme and rose as it was progressively scaled back, while the non-financial corporations share behaved conversely. Most returns accrued to non-financial corporations, but at some stages a significant number of individuals made direct investments. Hence a small amount has been attributed to the household sector.

16.56 For literary originals, all GFCF is attributed to the household sector.

Ownership transfer costs

16.57 For the stamp duties and other government charges components of ownership transfer costs, estimates are derived using direct data on stamp duties available from each State government. Estimates for the lawyers' and real estate agents' fees components are based on taxation statistics and the results from the periodic surveys published in *Real Estate Agents Industry, Australia* (Cat. No. 8663.0) and *Legal Accounting Services, Australia* (Cat. No.8678.0).

Price Indexes

16.58 The price indexes used in the PIM are essentially the same as those used in the preparation of chain volume estimates of gross fixed capital formation in the gross domestic product account (described in Chapter 15). However the latter, with the exception of intangible fixed 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. 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.

16.59 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 other buildings and structures other than roads—a general building price index derived from Haig[2] 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[3], and Bureau of Transport Economics data (1941–42 to 1947–48).

16.60 As with the GFCF data, the poorer quality of early data should be considered in the light of its small contribution to more recent year capital stock levels. Furthermore, unlike GFCF, most price indexes tend to be reasonably highly correlated over time.

16.61 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.

16.62 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.

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2 Haig B.D., *Capital Stock in Australian Manufacturing,* Department of Economics, Research School of Social Sciences, Australian National University, Canberra 1980.

3 Keating M., *The Growth and Composition of the Australian Workforce 1910-11 to 1960-61*; thesis submitted to the Australian National University, Canberra, 1967.

Machinery and equipment

16.63 Price deflators for machinery and equipment are compiled for the six equipment categories described above:

- computers and peripherals;
- electrical and electronic equipment;
- industrial machinery and equipment;
- road vehicles;
- other transport equipment; and
- other plant and equipment.

16.64 The six equipment deflators are used for all institutional sectors, industries and general government purpose classifications. They are constructed from a supply and use model which allows for the identification and treatment of imported components separate from the treatment of those components which are domestically produced. Price indexes from *Import Price Index* (Cat. no. 6414.0) are used to revalue the imported components, and price indexes from *Price Indexes of Articles Produced by Manufacturing Industry* (Cat. no. 6412.0) are used to revalue manufacturers' sales data. Current price and chain volume estimates of the supply of each of the six equipment categories are formed and used to derive implicit price deflators (IPDs) for the six equipment categories. The IPDs for four out of the six asset categories have been extended back to 1948–49 by linking on the total equipment deflator in 1984. The two asset types which have not been linked onto this deflator in 1984 are: computers, because the U.S. Bureau of Economic Analysis computer equipment price index is available back to the early 1960s; and motor vehicles, for which producer price indexes are available back to 1968 (and therefore the total equipment deflator has been linked onto this series in 1968).

Livestock

16.65 Acquisition and disposal prices are collected separately for beef cattle (breeding stock), dairy cattle, and wool producing sheep. The GFCF price is then calculated as the unit acquisitions price less the disposals price using the chained based approach at this level of detail. Annual acquisition prices are obtained from ABARE. Disposal prices are estimated using quarterly ABS livestock slaughterings information, as the ratio of the total value of slaughterings to the total number of slaughters, and then annualised.

Intangible fixed assets

Computer software

16.66 There is no Australian software price index currently available, although several countries have initiated development work to construct such indexes, and several experimental indexes over a limited time span have been published. Statistics Canada has developed an intuitive software price index in the Canadian SNA Input-Output Tables, which declines by 6% a year. This estimate is constructed by observing the trend of software prices over time for popular PC software. The ABS has chosen to use this index for the time being.

Intangible fixed assets continued

Entertainment, literary or artistic originals

16.67 *Music*—music originals are revalued using the wage cost index for Cultural and Recreational Services in *Wage Cost Index* (Cat. no. 6345.0).

16.68 *Film and TV*—from 1980, the CPI index for entertainment services is used. From 1976 to 1979, the CPI index for recreational goods is used. For 1974 and 1975 the CPI index for recreational goods and services is used. From 1970–71 to 1974, the aggregate CPI is used as there is no suitable component price index for this period. These component indexes are linked to form the film and TV price index.

16.69 *Literary*—the CPI index for books, newspapers and magazines is used back to 1977, and then the CPI for newspapers and magazines back to 1970–71. These two component indexes are linked to form the literary price index.

Mineral exploration

16.70 From 1969–70 the price index used to revalue both mineral and petroleum exploration expenditure is that used to revalue exploration expenditure in the derivation of chain volume estimates of the gross value added of services to mining—see Chapter 24. This price index is composed of price indexes of inputs to mineral and petroleum exploration. For the years between 1948–49 and 1969–70 the IPD for GDP is used. These series are linked to form the mineral exploration index.

Mean asset lives

16.71 The mean asset lives are the most important of the parameters used in the PIM. Together with asset life distributions (see paragraphs 16.95 to 16.103 below), 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

16.72 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. 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 perpetual inventory method (PIM) for estimating the capital stock. 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. 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 been captured to some extent by breaking expenditure on machinery and equipment down into six major classes. 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. 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

16.73 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.

Machinery and equipment continued

16.74 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 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.

16.75 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. Agricultural equipment can therefore 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 division, 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, allowance being made for the longer life of the heavy electrical equipment used in that industry.

16.76 Asset lives for machinery and equipment in 1996–97 are reported in table 16.4 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.

Machinery and equipment continued

16.77 In the case of road vehicles, which constitute over 30 per cent of gross fixed capital formation on machinery and equipment 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.

16.78 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 unapplicable. 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.

16.79 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.

16.4 MEAN ASSET LIVES (YEARS), EQUIPMENT LIVES BY TYPE OF EQUIPMENT AND INDUSTRY—1996–97

	Equipment type						
Industry	Computers and peripherals	Electrical & electronic equipment	Industrial machinery and equipment	Motor vehicles	Other transport equipment	Other plant and equipment	Weighted average
Agriculture, forestry and fishing	4.9	16	21.2	19.4	16	17.3	18.8
Mining	4.9	17.3	17.3	19.4	17.3	16	18.7
Manufacturing	4.9	13.4	15.1	19.4	13.4	12.1	14.4
Electricity, gas and water supply	4.9	30.4	20.1	19.4	18.2	17.3	15.9
Construction	4.9	13.4	15.1	19.4	13.4	12.1	21.5
Wholesale trade	4.9	18.2	15.1	19.4	18.2	17.3	17.1
Retail trade	4.9	18.2	20.1	19.4	18.2	17.3	17.4
Transport and storage	4.9	18.2	20.1	19.4	18.2	17.3	18
Communication services	4.9	15.1	17.3	19.4	15.1	14.4	14.6
Accommodation, cafes and restaurants	4.9	18.2	20.1	19.4	18.2	17.3	17.2
Finance and insurance services	4.9	15.1	17.3	19.4	15.1	14.4	11.9
Property and business services	4.9	15.1	17.3	19.4	15.1	14.4	15.2
Government administration and defence	4.9	15.1	17.3	19.4	15.1	14.4	12.9
Education	4.9	17.3	19.4	19.4	17.3	16	17.5
Health and community services	4.9	15.1	17.3	19.4	15.1	14.4	16.9
Cultural and recreational services	4.9	17.3	19.4	19.4	17.3	16	16.4
Personal and other services	4.9	17.3	19.4	19.4	17.3	16	17.3

Other buildings and structures

16.80 The estimated average lifespan of other buildings and structures (including alterations and additions) are given in table 16.5. These estimates are based on the findings of Walters and Dippelsmann, and a detailed dissection of the mean life of other buildings and structures into new buildings, construction (other than building), alterations and additions, and a weighted average were reported in table 22.1 in the previous edition of *Australian National Accounts: Concepts, Sources and Methods*. 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, giving an average age at demolition of 62 years. 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.

Other buildings and structures continued

Other buildings and structures—private corporations

16.81 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.

Other buildings and structures—public corporations

16.82 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 table 16.5. 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.

Other buildings and structures—general government

16.83 Other buildings and structures consists mostly of offices, schools, hospitals and roads. The average life of total other buildings and structures 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, in their capital stock estimates published in 1985, have been retained.

Dwellings

16.84 The estimates used by Walters and Dippelsman in 1985 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

16.85 The treatment for ownership transfer costs in the PIM is unique: these costs are depreciated instantaneously. Effectively the GFCF is fully recorded as consumption of fixed capital in the same period. This treatment means that the effective life of ownership transfer costs is zero.

16.5 MEAN ASSET LIVES (YEARS), OTHER BUILDINGS AND STRUCTURES, DWELLINGS, AND OWNERSHIP TRANSFER COSTS BY INDUSTRY AND INSTITUTIONAL SECTOR

	Private corporations	Public corporations and general government
OTHER BUILDINGS AND STRUCTURES		
Agriculture, forestry and fishing	41	41
Mining	29	29
Manufacturing	38	38
Electricity, gas and water supply	55	n.a.
Electricity and gas	n.a.	37
Water, sewerage and drainage	n.a.	71
Construction	44	44
Wholesale trade	50	38
Retail trade	50	38
Transport and storage	40	n.a.
Urban transport	n.a.	51
Rail transport	n.a.	67
Sea transport	n.a.	47
Air transport	n.a.	30
Other transport and storage	n.a.	49
Communication	40	49
Accommodation, cafes and restaurants	50	41
Finance and insurance	58	n.a.
Property and business services	57	57
Government administration and defence	n.a.	54
General government roads	n.a.	33
Education	50	50
Health and community services	50	50
Cultural and recreational services	50	50
Personal and 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.
Other buildings and structures	0	n.a.

Livestock

16.86 Information about mean asset lives of breeding and dairy cattle, and wool producing sheep, are 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 (see table 16.6 below).

Intangible fixed assets

Computer software

16.87 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.

16.88 *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 (see table 16.6 below). 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.

16.89 *Purchased (packaged) software*—for years up to 1988–89, a mean life of 6 years has been chosen (see table 16.6 below). 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

16.90 *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.

16.91 *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).

16.92 *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

16.93 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 (see table 16.6).

Intangible fixed assets continued

16.94 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.

16.6 MEAN ASSET LIVES, CULTIVATED ASSETS AND INTANGIBLE FIXED ASSETS—1996–97

	Mean life (years)
Livestock	
Sheep (wool)	6
Dairy	10
Bulls (breeding)	7
Computer software	
In-house and customised (a)	6
Purchased (b)	4
Artistic originals	
Film and TV	3
Music	1.7
Literary	1.7
Exploration	34

(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

16.95 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[4] 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.

16.96 Exceptions to the use of Winfrey S3 are made for alterations and additions and for some intangible fixed assets. 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.

16.97 In the case of intangible fixed assets, several approaches have been taken, as described below.

4 Winfrey R., *Statistical Analysis of Industrial Property Retirements,* Iowa State College of Agricultural and Mechanic Arts, 1938.

16.98 *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 softwares' mean life and maximum life.

16.99 *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.

16.100 *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.

16.101 *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 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.

16.102 *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.

16.103 *Mineral exploration*—a Winfrey S3 function is used.

CHAPTER 17 CHANGES IN INVENTORIES

INTRODUCTION

17.1 *Changes in inventories* is defined to include changes in:

- goods for sale, whether of own production or purchased for resale;
- work in progress; and
- raw materials and stores.

Work put in place on structures, including dwellings, and on other forms of construction (e.g. roads, dams, ports) is excluded from inventories and included in gross fixed capital formation. 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

17.2 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.

17.3 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. 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.

17.4 In the ASNA, the 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.

VALUATION OF CHANGES IN INVENTORIES *continued*

17.5 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.
- *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.

17.6 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 assumption.

17.7 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 represented by 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).

An example of the calculation of the IVA is provided in Appendix A.

VALUATION OF CHANGES IN INVENTORIES *continued*

17.8 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:

- 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;
- 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;
- the commodity composition of inventories held by any particular industry remains fixed; and
- the rate of physical increase (or decrease) in inventories is constant throughout the quarter.

SOURCES AND METHODS—CURRENT PRICE ESTIMATES

17.9 The quarterly values of changes in inventories published in the national accounts are derived by interpolating annual benchmarks with quarterly estimates. From 1994–95 to the latest year but one, annual benchmarks are derived in supply and use tables. The sources and methods used to obtain these annual benchmarks are described in Chapter 12. For all other years, annual estimates of the changes in inventories are essentially an aggregation of the quarterly estimates described below. 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. 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 under the headings that follow.

Private non-farm inventories

17.10 The quarterly Survey of Inventories, Sales and Services (SISS) provides the basic data for estimating *changes in private non-farm inventories*. This survey actually collects estimates of the 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 are published in the quarterly national accounts.

17.11 The SISS provides the quarterly movements in inventories for mining; manufacturing; wholesale trade; retail trade; electricity and gas; and accommodation, cafes and restaurants. The survey does not include some non-farm industries with only minor inventory holdings. For these industries, data from the periodic economic censuses and Taxation Statistics are used to estimate annual changes, which are extrapolated and interpolated using the estimates for in-scope industries. Also included for all periods are the changes in inventories for former public marketing authorities which have been privatised.

Farm inventories

17.12 *Changes in farm inventories* includes changes in (i) inventories held on farms (including wool, wheat, barley, oats, maize, sorghum, hay, fertiliser, apples and pears, and livestock); (ii) wool held in store awaiting sale; and (iii) produce (e.g. vegetables) held in cold store where ownership remains with the primary producer. Farm inventories do not include inventories held by marketing authorities (e.g. wheat held by the Australian Wheat Board), which are included under either 'Public authorities' or 'Private non-farm'.

17.13 Annual and quarterly changes in the book value of inventories of wool are estimated as the difference between inventory levels derived from information provided monthly by the National Council of Wool Selling Brokers. Annual and quarterly changes in the book value of inventories of apples and pears are estimated as the difference between inventory levels derived from information provided monthly by the Tasmanian Department of Agriculture.

17.14 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 *Agricultural Commodities, Australia* (Cat. no. 7121.0). Disposals are estimated from export statistics, marketing authority statements, estimates of seed purchased or retained on farms for use as seed or fodder, and materials used in manufacturing statistics from the annual ABS Manufacturing 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.

17.15 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 the Australian Bureau of Agricultural and Resource Economics (ABARE). 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.

Public authorities inventories

17.16 *Changes in public authorities inventories* includes estimates for both public marketing authorities and other public authorities.

17.17 Quarterly estimates of changes in the book value of marketing authorities inventories are derived from information supplied by the authorities concerned. See also paragraph 17.11.

17.18 Other public authorities comprise public corporations and general government. Recorded inventories include stockpiles of raw materials and the work in progress and finished goods of commercial activities such as the work of the Sydney Organising Committee for the Olympic Games (SOCOG), demonetised gold transactions (gold sales and gold loans) by the Reserve Bank of Australia and the construction of military equipment for export.

Public authorities inventories *continued*

17.19 Annual estimates of changes in the book value of other public authorities inventories are derived from information used to compile 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.

17.20 Quarterly data are obtained from a quarterly collection covering all significant public corporations and from the Department of Finance and Administration's quarterly Ledger.

Inventory valuation adjustment

17.21 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.

17.22 The book values of private non-farm inventories are disaggregated into 22 industry groups (mining; nine within manufacturing; six within wholesale trade; retail trade; cafes and restaurants; electricity and gas; construction; transport and storage; and other private non-farm). 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, making a total of 32 'estimation cells'. An IVA is derived for each estimation cell in the manner and using the assumptions described in paragraphs 17.5 to 17.8.

17.23 In contrast to private non-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. 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 by the Australian Wheat Board and wool selling brokers respectively. 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 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.

17.24 An IVA is calculated for the marketing authorities component of public authority inventories, using book values and price indexes in the same way that IVAs are calculated for private non-farm. Due to the relatively low level of inventories and the lack of information on the commodity dissection involved, no IVA is calculated for other public authority inventories.

Private non-farm inventories

17.25 The general techniques used for calculating chain volume measures are described in Chapter 10. These are also used in calculating chain volume estimates of changes in private non-farm inventories. However, it should be emphasised that 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:

(1) Revalue quarterly book value levels 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.

17.26 The price indexes that are used to revalue book value levels of inventories are formed by weighting together component price indexes from *Consumer Price Index* (Cat. no. 6401.0), *Price Index of Articles Produced by Manufacturing Industry* (Cat. no. 6412.0), *Import Price Index* (Cat. no. 6414.0) and *Price Indexes of Materials Used in Manufacturing Industry* (Cat. no. 6411.0), and wage rate indexes from *Wage Cost Index* (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.

17.27 Chain volume estimates of changes in private non-farm inventories are published in the following detail in the national accounts:

- 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 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.

Farm and public authorities inventories

17.28 The techniques used to calculate chain volume estimates of changes in farm inventories and changes in public authorities 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. The sources and methods used to derive constant price estimates of changes in inventories for farm and public authorities were described in the previous edition of this manual. 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)–(6) As outlined above for changes in private non-farm inventories.

17.29 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. 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.

APPENDIX A Example of the calculation of the inventory valuation adjustment

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

CHAPTER 18 EXPORTS AND IMPORTS

INTRODUCTION

18.1 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.

18.2 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 in its Chapter 6 (Current Account: Goods) and Chapter 7 (Current Account: Services). The material in this chapter is essentially a summary of that provided in Cat. no. 5331.0, which should be consulted if further detail is required.

18.3 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.

18.4 In the various national accounts publications, exports and imports of goods and services are generally shown as a single aggregate. (The main exception is the detailed input-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. Table 18.1 shows the main components.

18.1 GOODS AND SERVICES—MAIN COMPONENTS SHOWN IN THE BALANCE OF PAYMENTS

Goods	General merchandise
	Goods for processing
	Repairs on goods
	Goods procured in ports by carriers
	Non-monetary gold
Services	Transportation services
	Travel services
	Other services

18.5 '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.

18.6 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.

18.7 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.

18.8 The remainder of this chapter deals with the sources and methods for compiling exports and imports of goods and services. The compilation of current price estimates is described first, followed by that of volume estimates.

CURRENT PRICES

Goods

18.9 The main data source for exports and imports of goods is the ABS's international trade statistics (ITS), which are derived from information reported by exporters and importers, or their agents, to the Australian Customs Service. However, as international trade statistics do not cover all goods exported and imported, and do not necessarily record exports and imports in the period in which the changes of ownership actually take place, they are supplemented by other sources. The most notable of these are:

- the ABS's quarterly Survey of Principal Transport Enterprises, which provides information on offshore installations, ships, aircraft and satellites operating in Australian or international waters or airspace that are sold by residents to non-residents or purchased by residents from non-residents;
- the ABS's quarterly Survey of International Trade in Services, which provides information about goods procured in foreign ports by Australian carriers and about certain repairs on transportation equipment;
- quarterly advices from the Department of Defence on exports and imports of defence equipment; and

Goods *continued*

- monthly and quarterly advices from the Reserve Bank of Australia, which provide information on gold sales and purchases by non-residents (where the gold is held in custody in Australia by the Reserve Bank) and certain gold exports and imports associated with Reserve Bank gold loans.

18.10 As all of the sources required to compile statistics on exports and imports of goods are available at least on a quarterly basis, the annual estimates are obtained by summing the quarterly estimates.

Transportation services

18.11 The principal sources of information on exports and imports of transportation services are the International Trade Statistics, which are used to compile estimates of imports of freight services associated with goods imports, and the Survey of International Trade in Services (SITS), which is used to compile all other components of transportation services, with adjustments from other sources. Annual estimates are obtained by summing quarterly estimates.

Travel services

18.12 Three data models are used to provide estimates of exports and imports of travel services. The models cover:

- *Travel by Australian residents abroad*—this model is based on data about the credit card and travellers' cheque expenditure abroad by Australian travellers, as well as expenditure on cruise fares and prepaid packages, sourced from the Survey of International Trade in Services. These data are supplemented by data on cash taken abroad by Australian travellers and on other sources of travel finance collected every four years in the Survey of Returned Australian Travellers.
- *Travel by non-residents (other than students) in Australia*—this model applies estimates of per capita expenditure, from the Bureau of Tourism Research's quarterly International Visitor Survey (IVS), to numbers of travellers obtained from the ABS's monthly overseas arrivals and departures statistics, with adjustments from other sources.
- *Travel by non-resident students in Australia*—this model primarily applies estimates of per capita expenditure by students holding education visas from the Department of Education, Training and Youth Affairs' (DETYA) Surveys of International Students (which are extrapolated and interpolated using CPI data) to estimates of the number of foreign students studying in Australia, which are also obtained from DETYA. The DETYA data are supplemented for expenditure for non-resident students who do not hold education visas with information derived from the IVS.

18.13 Each of these models provides monthly and quarterly estimates. Annual estimates are obtained by summing quarterly estimates.

Other services

18.14 The principal source for estimates of exports and imports of other services is the Survey of International Trade in Services. Estimates of insurance services are based on a data model, of which the main input is the Australian Prudential Regulatory Authority's Survey of Insurance Companies and Agents. Estimates of financial services are also derived primarily from two data models, one which is used to estimate financial intermediation services indirectly measured on loans and deposits with non-resident financial corporations, and the other which is used to estimate implicit fees on foreign exchange trading. Information from the Commonwealth government and the State governments is used to estimate certain government services, while periodic data from foreign embassies are used to estimate embassies' imports of services.

18.15 The quality of the estimates varies for each of the components that make up the overall estimates for exports and imports of other services.

CHAIN VOLUME MEASURES

Exports of goods

18.16 For about 85 per cent, by value, of export commodities, the volume measures are obtained by quantity revaluation, using quantity information recorded in the ITS. The volume measures of the remainder are calculated by deflating current price values using either price indexes or implicit price deflators obtained from quantity revaluation of similar components. The price indexes used include a price index for computer equipment from the U.S. Bureau of Economic Analysis (which is lagged by three months and adjusted for $A/US exchange rate conversion factors) and the ABS price indexes underlying those published in *Export Price Index, Australia* (Cat. no. 6405.0) and *Price Indexes of Articles Produced by Manufacturing Industry, Australia* (Cat. no. 6412.0). The volume measures of the coverage and timing adjustments that are made to bring exports as recorded in the International Trade Statistics onto the required national accounts/balance of payments basis are derived using relevant implicit price deflators from the underlying quantity data, the *Export Price Index, Australia* (Cat. no. 6405.0) or a combination of both.

Exports of services

18.17 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 Industry, 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 Cost Index* (Cat. no. 6345.0), as well as some special purpose price indexes. 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 of goods

18.18 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, for which the above-mentioned computer equipment price index from the U.S. Bureau of Economic Analysis is used, and an overseas price index for sea transport equipment.

Imports of services

18.19 In most cases, volume measures are derived by deflating current price values using consumer price indexes from overseas countries, adjusted by exchange rate conversion factors. 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 19 COMPENSATION OF EMPLOYEES

INTRODUCTION

19.1 This component consists of the value of entitlements earned by employees from their employers for services rendered during the accounting period. It covers wages and salaries received by employees in cash and in kind, changes in provisions for future employee entitlements (although estimates of these are not yet included in the ASNA), and employers' social contributions.

DESCRIPTION

19.2 *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, 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 therefore payments to them are excluded from wages and salaries and included instead as social assistance benefits.

19.3 *Wages and salaries* comprise the value of employee entitlements, including those paid in cash and in kind, and changes in provisions for future employee entitlements (although the latter component has not yet been implemented in the ASNA). Cash incomes are gross payments before taxation and other deductions, and include commissions, tips, sick pay, pay for annual and long service leave, penalty pay and shift allowances. Income in kind covers the cost to the 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 are the provision of food and accommodation (other than when the employee is travelling on business for the employer), motor vehicles for private use, and education expenses. Loans by employers to employees at rates of interest below market rates are regarded as involving income in kind. Consequently, the difference between interest calculated at market rates and the interest actually paid by the employee is included in wages and salaries. Fringe benefits taxes which are payable on income in kind provided to employees are not included as part of wages and salaries because in the national accounts they are treated as a component of taxes on production and imports. This treatment is adopted because it is the employer who is legally liable for the fringe benefits tax, not the employee.

19.4 *Employers' social contributions* are contributions by employers to pension and superannuation funds; and premiums paid by employers to workers' compensation schemes for occupational injuries and diseases. SNA93 recommends that the following be classified as employers' social contributions: 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. However, this has not been implemented in the ASNA because, in Australia, data providers are unable to consistently differentiate between these various types of severance and leave payments, and other wage and salary payments. These payments are therefore included in the ASNA estimates of wages and salaries.

DESCRIPTION *continued*

19.5 *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.

19.6 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 estimates

19.7 Annual estimates for wages and salaries for Australia, and by State, are an aggregation of the quarterly estimates. Industry estimates for Australia are derived annually from the balanced S-U tables, except for the latest financial year, for which estimates are obtained by extrapolation using movements based on the quarterly data sources outlined below. Wages and salaries in relation to annual and long service leave are generally recorded on a payments basis. However, where long service leave arrangements are organised through separately constituted industry funds, such as those for the building and construction industry, it is the employers' payments into those funds which are included in compensation of employees. In effect, such long service leave funds are treated in a similar fashion to superannuation funds.

19.8 For the superannuation component of employers' social contributions, estimates are prepared separately for the funded schemes and for the unfunded (or partly funded) schemes. The funded superannuation component of employers' social contributions is the sum of employer contributions to funded schemes operated by life insurance offices and separately constituted pension funds. Data sources consist of the Survey of Major Labour Costs and the annual S-U tables.

19.9 A substantial number of general government employees and employees of a number of public non-financial corporations are covered by unfunded or partly funded superannuation schemes. Superannuation contributions for unfunded and partly funded schemes are imputed, based on the employers' contributions that are implicitly required to fund future benefit payments in relation to these schemes. The imputed estimates for unfunded and partly funded superannuation schemes are compiled by the ABS Public Finance Section using data from the Commonwealth and State Treasuries on unfunded employee liabilities, and data from the Commonwealth Actuary regarding the contributions that would be required to fund the Commonwealth's liabilities if the contributions were paid into a separate superannuation fund. The treatment of unfunded superannuation schemes is discussed more fully in Chapter 22.

19.10 Industry data for employers' contributions to superannuation are obtained from the annual supply and use tables for all sectors except general government. Industry data for this component for general government are based on data from the Survey of Major Labour Costs.

19.11 Estimates of the workers' compensation component of employers' social contributions are benchmarked to the annual S-U tables, both in total and by industry. However, the estimates from the S-U tables for the general government component of this aggregate are based on data from the Survey of Major Labour Costs. The workers' compensation premiums which are included in employers' social contributions include direct workers' compensation premiums payble and the direct cost of workers' compensation to employers who are permitted to self-insure. Additional payments by employers which are made voluntarily to their employees to cover the difference between workers' compensation payments and their normal wages are included in the wages and salaries component of compensation of employees, rather than being included in employers' social contributions.

Quarterly estimates

19.12 Estimates of wages and salaries are made for each State and Territory by summing the following elements:

- wages and salaries paid in cash to employees of the private non-farm sector and civilian employees of the public sector, both of which are on a basis adjusted for pay periodicity;
- farm wages and salaries;
- changes in provisions for future employee entitlements (not yet included);
- payments to members of the defence forces;
- payments made to the staff of Australian embassies and consulates overseas;
- the value of income paid in kind; and
- adjustments for labour income included in the balance of payments statistics.

19.13 For quarters and years up to and including 1980–81, estimates for civilian wages and salaries paid in cash were based principally on monthly payroll tax returns and government returns, with an adjustment for businesses exempt from payroll tax. Estimates for the quarters of 1981–82 and 1982–83 were based on data from the interim Quarterly Survey of Earnings and numbers of wage and salary earners from the Labour Force Survey (LFS). Estimates for quarters from September quarter 1983 are based on the large scale Survey of Employment and Earnings (SEE) together with quarterly information from the LFS.

19.14 The SEE collects employment and earnings data from a sample of both private employers and public sector units (prior to September quarter 1988 the collection covered all government sector units rather than a sample). Excluded from the survey are employees in the private sector primarily engaged in agriculture, forestry and fishing; persons employed in private households; employees of foreign embassies, consulates etc. in Australia; employees based outside Australia; and members of the Australian permanent defence forces. As the SEE is an employer based survey, it provides data on the number of jobs held and earnings derived from jobs held. However, due to unavoidable delays in recording new businesses on the ABS business register (from which the SEE sample is drawn), and other deficiencies in the coverage of the business register, the SEE tends to understate total employment and earnings. The extent of the coverage problems was significantly reduced from December quarter 1996 when adjustments were made to the whole time series to allow for missing businesses and an ongoing new business provision was introduced.

19.15 The LFS is based on a sample of dwellings, and provides information on the number of people in jobs (as opposed to SEE which provides estimates for the number of jobs held). All civilians aged 15 and over are represented in the sample except for diplomatic personnel of foreign governments and other foreign residents in Australia. Although the LFS does not provide the information on earnings required for national accounts purposes, it provides a more complete estimate of the number of wage and salary earners than does the SEE. As a result, the employment and earnings estimates obtained from the SEE are used in conjunction with the LFS estimates (and various other sources) to obtain an estimate of total wages and salaries on a quarterly basis.

19.16 From 1983–84, civilian wages and salaries paid in cash are estimated in the following way. Estimates of farm wages and salaries and non-farm 'unrecorded' wages and salaries are added to wages and salaries derived from the SEE. Farm wages and salaries are derived from the Agricultural Finance Survey (AFS). For those years when the AFS was not conducted, estimates were interpolated using other indicators such as Australian Bureau of Agricultural and Resource Economics indexes of prices paid for hired labour. Non-farm 'unrecorded' wages and salaries are estimated as the difference between the number of employee jobs from the SEE and the number of non-farm employed wage and salary earners from the LFS (adjusted for multiple jobholding, employees on strike, employees on worker's compensation not paid through the payroll, employees on unpaid absences and employees overseas), multiplied by the average wage rate from SEE. The adjustment for multiple jobholding converts the LFS employment estimate to a jobs basis which is consistent with the SEE number of jobs measure. The estimates for multiple jobholding are based on data from the periodic Survey of Multiple Jobholding which is conducted as a supplementary component of the Labour Force Survey.

19.17 Salaries and allowances for members of the defence forces are derived from annual information supplied by the Department of Defence and allocated to quarters using data for defence wages paid, from the Department of Finance and Administration ledger. The Department of Finance and Administration is also the source for estimates of wages and salaries paid to Australian residents employed overseas in Australian embassies and consulates. The value of income paid in kind is estimated using annual data relating to the value of fringe benefits which are supplied by the Australian Taxation Office and allocated to quarters using linear interpolation and extrapolation. Labour income to and from overseas is obtained from the balance of payments statistics.

19.18 SNA93 is explicit in recommending that compensation of employees be measured on an accrual basis. In principle, this requires that the total cost of employee compensation be reflected in the periods in which the employee provided services to the employer. Provisions for employee entitlements which qualify as wages and salaries include provisions for long service leave and annual leave. An important aspect of accrual accounting is that wages and salaries should be recorded on a time worked basis rather than on the number of paydays in an accounting period. The methods used to implement this treatment vary over the time period covered by the estimates for wages and salaries. In the quarterly national accounts, data for compensation of employees for all periods are published on a basis adjusted for pay periodicity.

19.19 From the September quarter 1996, a significant step in the direction of accrual accounting was implemented in the SEE, with the collection of data to enable accurate pay-day adjustment of earnings to a 'payable' basis. A pay-day adjustment based on data from the Pay Periodicity Survey had previously been applied in the seasonal adjustment process, but not in the derivation of original estimates. This survey was last conducted in respect of September quarter 1992, and adjustment factors for subsequent quarters were calculated using these benchmark data and calendar information. Pay Periodicity Surveys were previously conducted in respect of the September quarter 1984 and the September quarter 1988. Prior to the introduction of the SEE, pay periodicity factors were derived using regression analysis.

19.20 Quarterly estimates of employers' social contributions are usually obtained for each State and Territory by distributing the annual estimates according to the quarterly distribution of private wages and salaries and public civilian wages and salaries. For incomplete years, the quarterly estimates of employers' social contributions are generally calculated by using the proportion of social contributions to civilian wages and salaries in the previous year adjusted as appropriate for any expected change in this proportion. The quarterly allocation of employers' social contributions has been adjusted for some recent years to allow for the impact of the introduction of the Superannuation Guarantee Levy legislation.

CHAPTER 20 GROSS OPERATING SURPLUS AND GROSS MIXED INCOME

INTRODUCTION

20.1 The closely related concepts of gross operating surplus (GOS) and gross mixed income (GMI) are defined in Chapter 4. Both GOS and GMI measure the surplus accruing from processes of production before deducting any explicit or implicit interest charges, land rent or other property incomes payable on the financial assets, land or other tangible non-produced assets required to carry on the production. GOS and GMI are defined as gross value added minus compensation of employees, minus taxes on production and imports payable plus subsidies receivable. Net operating surplus and net mixed income are equal to GOS and GMI less consumption of fixed capital.

20.2 GOS and GMI are derived as the excess of gross output over the costs incurred in producing that output before allowing for consumption of fixed capital. Gross output includes sales of goods and services (plus changes in inventories of work in progress and finished goods); subsidies received; other operating income such as sales commissions and rentals, leasing and hiring revenue (excluding land rent); FISIM receivable by financial corporations; and production of capital goods for own use. It excludes receipts of interest, land rent, rent on natural resource assets, dividends and proceeds from sales of fixed assets. The relevant costs include: compensation of employees; taxes on production and imports; and intermediate consumption of goods and services. (Excluded are payments of interest, land rent, rent on natural resource assets and dividends, and consumption of fixed capital.) Intermediate consumption includes FISIM payable and an insurance service charge which is calculated as premiums plus premium supplements less expected claims. (The concept of premium supplements is explained below in paragraph 20.36).

20.3 In this chapter, the discussion is organised according to the types of institutional units for which estimates of GOS and GMI are made, namely: private non-financial corporations; public non-financial corporations; unincorporated enterprises (excluding dwellings owned by persons); dwellings owned by persons; general government units; and financial corporations. The distinction between private and public non-financial corporations is based on who controls the corporations. The criterion for recognising government-controlled corporations and quasi corporations is based on the SNA93 definition of control, which is

> "the ability to determine general corporate policy by appointing the appropriate directors, if necessary. Owning more than half the shares in a corporation is evidently a sufficient, but not a necessary condition for control." (SNA93 paragraph 4.30).

Consequently, corporations where a government owns more than 50 per cent of the shares in the corporation are classified as public. In addition, in some cases a government may control a corporation when it holds 50 per cent or less of the shares in the corporation. For example, government control can exist where special legislation or regulations empower a government to determine corporate policy or to appoint the directors of a corporation. Corporations controlled by other government-controlled corporations are considered to be government controlled.

PRIVATE NON-FINANCIAL CORPORATIONS AND QUASI CORPORATIONS

Annual estimates

20.4 From 1994–95 the supply and use tables provide annual estimates for GOS plus GMI in total for all types of institutional units. Benchmark estimates for total GOS of private non-financial corporations are derived by subtracting estimates of GOS plus GMI for all other types of institutional units (derived as described below) from total GOS plus GMI from the S-U tables. Annual benchmarks for GOS of private non-financial corporations are derived from the annual S-U tables for all but the latest year. Estimates for the latest year are based on movements in the quarterly ABS Company Profits Survey. See Chapter 12 for details about the sources and methods used to compile the annual S-U tables.

Quarterly estimates

20.5 To provide quarterly estimates of the GOS of private non-financial corporations, the annual benchmarks are allocated to quarters using data from the publication *Company Profits, Australia* (Cat. no. 5651.0). (A special benchmarking procedure is used to avoid any step problem arising in September quarters due to variability in the relationship between the annual estimates for the indicator and benchmark series.) Quarterly data for company profits, net interest paid and depreciation from the survey are applied to the corresponding annual benchmark estimates for these components of GOS. The survey data for company profits are first adjusted to remove capital gains and losses, which are not included in the national accounts measure of the value of production. There are a number of other components of GOS which cannot be collected in the Profits Survey, including the Inventory Valuation Adjustment (IVA), FISIM payable, imputed insurance service charges and adjustments relating to the capitalisation of software, mineral exploration expenditure and artistic originals. The IVA is estimated directly each quarter and aggregated to derive annual estimates, while the other components of the GOS of private non-financial corporations are either allocated using appropriate indicators or estimated by linear trend interpolation and extrapolation.

PUBLIC NON-FINANCIAL CORPORATIONS AND QUASI CORPORATIONS

Annual estimates

20.6 Estimates are compiled from annual financial statements included with the annual reports of the corporations and quasi corporations, and Auditors'-General Reports.

Quarterly estimates

20.7 A quarterly survey of large public non-financial corporations and quasi corporations is conducted to obtain revenue and expenditure data.

UNINCORPORATED ENTERPRISES

Annual estimates

20.8 Estimates of unincorporated enterprises' gross mixed income are derived separately for the farm and non-farm sectors.

20.9 Annual gross mixed income by industry for non-farm unincorporated enterprises is derived from Taxation Statistics supplemented by information from ABS and other sources. As there is a time lag in obtaining complete income tax data, estimates for the most recent two years are based on preliminary taxation data and various other indicators. At the time of the release of the annual national accounts, the third last year is based on complete taxation data, the second last year is based on preliminary taxation data and the last year is based on the same sources as those used to prepare the quarterly estimates (see below).

20.10 Net business income (excluding amounts pertaining to agriculture) from Taxation Statistics is adjusted as follows to derive GMI:

Gross mixed income equals net business income

plus investment allowances deducted in the taxation data
plus depreciation allowed in the taxation data
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 non-life insurance adjustment
plus capitalised software adjustment
less FISIM
less IVA.

20.11 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. They are constructed using data from ABS government finance statistics, ABS collections from financial corporations, Reserve Bank of Australia, the Australian Prudential Regulatory Authority, balance of payments and Taxation Statistics. (The data sources and methods used to estimate net interest, land rent and royalties on natural resources are described more fully in Chapter 22.)

20.12 The finance lease adjustment is required because businesses can choose to write off the whole of 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 GMI. Estimates of the adjustment have been derived from Taxation Statistics and ABS statistics on financial corporations' income derived from finance leasing.

20.13 Owner-builders' GMI is derived as a proportion of owner-builders' value of work done, as recorded in the quarterly ABS Building Activity Survey. Net non-dwelling rent received is based on taxation data adjusted to exclude rent received on tenanted dwellings.

20.14 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, a substantial adjustment is made to the net business income data obtained from Taxation Statistics 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). Therefore, the adjustment applied relies on an assessment of diverse information including anecdotal evidence. Estimates have been derived predominantly using the following:

- broad estimates of tax evasion by corporations and unincorporated enterprises for the year 1983–84 provided by the Commissioner of Taxation in the Draft White Paper *Reform of the Australian Tax System, June 1985*;
- an analysis of long term trends in the difference between current price measures of GDP derived using the income and expenditure approaches before the inclusion of any adjustments for the understatement of business incomes when using the income approach. The understatement of business income is a major contributor to the tendency for the expenditure measure to exceed the income measure, so this difference has been used as an indicator of the extent of understatement. (This point applies particularly to years prior to 1994–95, which was the first year for which balanced S-U tables were used in the compilation of the accounts.);
- judgements about the effect of specific measures undertaken by the Australian Taxation Office to reduce the amount of evasion. For example, the introduction of the prescribed payments system (PPS) in 1983 was expected to substantially reduce tax evasion in the targeted industries, particularly the construction industry. Data from the tax amnesty (May to October 1988) for late or non-filers have also been used to trend the adjustment; and
- judgements about the differing incidence of tax evasion between industries.

The present adjustments for understatement of net business income are currently being re-evaluated using more up-to-date information.

20.15 A number of adjustments are made to apply various national accounting conceptual treatments, which were introduced as part of the implementation of SNA93 in the 1997–98 issue of the ASNA. An allowance is included for the imputed income derived by households who produce some of their own goods, particularly in relation to home made beer and wine, and the value of fish caught for home consumption. 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. Adjustments are also required to appropriately record the value of financial services consumed by unincorporated businesses, covering both non-life insurance and FISIM (for details see paragraphs 20.34 to 20.37 below).

20.16 The derivation of the IVA is described in Chapter 17. The annual IVA is obtained as the sum of the IVAs for the four quarters of each financial year.

20.17 Gross mixed income of farm unincorporated enterprises is derived as the difference between total farm GOS and GOS of private farm corporations and quasi corporations. Total farm GOS 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.

20.18 The gross value of agricultural production is estimated from data collected in the ABS annual Agricultural Commodity Survey together with additional data from various marketing organisations, wholesalers, brokers and auctioneers. Detailed estimates for each State and Territory and for Australia are published in *Agriculture, Australia* (Cat. No. 7113.0). The general approach used is to derive the market value of agricultural production by collecting quantity data from agricultural establishments and marketing organisations and multiplying these quantities by prices supplied by marketing boards, marketing reports, wholesalers, brokers and auctioneers. For wheat, the current period crop is initially valued at the price expected to be realised on eventual sale. Before costs are deducted, an allowance is also made for subsidies not included in the gross value of agricultural production (e.g. drought relief) and a production valuation adjustment (PVA) is deducted. 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 average current period prices (the basis required for national accounts). 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.

20.19 Farm costs such as electricity, fuel, maintenance of plant and structures, chemicals, insurance, fertilisers and contract payments are estimated using data from the periodic ABS Agricultural Finance Survey (AFS). For preliminary estimates made prior to AFS data becoming available, data from the Australian Bureau of Agricultural and Resource Economics (ABARE) publication *Australian Commodities Forecasts* and Issues are used to move forward AFS-based estimates. Seed costs are derived using data for area sown multiplied by applicable seeding rates multiplied by price per tonne. Fodder costs are derived as a residual after deducting the value of exports and non-fodder uses of these products from the gross value of production. Marketing costs are derived as gross value of production less local value of production, taken from *Agriculture, Australia* (Cat. no. 7113.0).

20.20 As previously explained, an estimate of farm GOS for private non-financial corporations and quasi corporations is deducted to give gross mixed income of farm unincorporated enterprises. The estimate for private non-financial corporations is relatively small and is derived using company income data from Taxation Statistics.

Quarterly estimates

20.21 As the scope of the quarterly Company Profits Survey does not include unincorporated enterprises, quarterly estimates of non-farm unincorporated enterprises' GMI are obtained by moving forward the annual benchmarks using various activity indicators or on trend. The indicators include a range of data relating to turnover (e.g. retail sales, capital expenditure on dwellings, and estimates for consumption of medical services) and costs (e.g. wages and salaries paid). Sources and methods used to estimate quarterly GMI for owner-builders are the same as those used to derive the annual estimates.

20.22 A range of indicators (described in paragraphs 20.23 and 20.24 below) is used to allocate annual estimates of farm gross mixed income to quarters. Estimates for the latest incomplete year 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 the data detailed in these paragraphs become available. The annual forecasts largely depend on ABARE data, which are regularly revised to reflect weather and market conditions.

20.23 Annual estimates of the gross value of production for wheat and barley are allocated to quarters on the basis of receivals data supplied by the respective marketing boards. Estimates for other grains and crops are largely allocated according to proportions derived on the basis of the applicable harvesting season. For livestock slaughterings, the annual estimates of gross value of production are allocated to quarters using estimates of the quantity of meat produced obtained from the quarterly publication *Livestock Products, Australia* (Cat. no. 7215.0). Quarterly estimates for wool production are derived using quantity and value data supplied by the Australian Wool Exchange Limited.

UNINCORPORATED ENTERPRISES *continued*

20.24 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. The derivation of the production valuation adjustment mentioned in paragraph 20.18 is described in Chapter 17.

DWELLINGS OWNED BY PERSONS

20.25 As mentioned in Chapter 4, owner-occupiers of dwellings, like other owners of dwellings, are regarded as operating businesses that generate a gross operating surplus. The imputation of a 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. Owner-occupiers are regarded as receiving rents (from themselves as consumers), paying expenses, and making a net contribution to the value of production which accrues to them as owners. GOS for ownership of dwellings is derived as gross rent (both actual and imputed) less operating expenses (but before the deduction of consumption of fixed capital). An estimate of GOS for dwellings owned by sectors other than households is deducted to obtain GOS for dwellings owned by persons.

Annual estimates

20.26 The sources and methods used to estimate gross rents of tenanted dwellings and to impute gross rent to owner-occupied dwellings are described in Chapter 14.

20.27 Operating expenses related to dwelling GOS include municipal rates, building insurance, repairs and maintenance, consumption of financial services and real estate agent commissions charged for the management of rental properties. In this context repairs and maintenance cover 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. General municipal rates, and 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—see Chapter 14) and movements in appropriate component price indexes from the CPI. Estimates for building insurance (premiums plus premium supplements less expected claims) are derived from annual data published by the Australian Prudential Regulation Authority (APRA). The item 'consumption of financial services' comprises the imputed service charge component of interest payable on loans used to finance the purchase of dwellings by persons. The concept of financial intermediation services indirectly measured (FISIM) and the methods used to estimate it are described below in the section on financial corporations GOS. The imputed financial service charge relating to dwellings owned by persons is a component of FISIM. Estimates for real estate agents' management fees are derived using data from the ABS 1980 Housing Occupancy Survey and agents' fee schedules, and extrapolated using estimates of gross rents of tenanted dwellings as an indicator.

DWELLINGS OWNED BY PERSONS *continued*

20.28 The processes described in the previous paragraph provide an estimate of GOS for ownership of dwellings by landlords as well as owner-occupiers. GOS relating to ownership of dwellings by the public sector (derived from ABS government finance statistics) and non-financial corporations (derived using benchmark data from past Surveys of Interest, Rent, Royalties and Dividends) are deducted to give GOS from ownership of dwellings by persons.

Quarterly estimates

20.29 The data sources and methods used to compile quarterly estimates of gross rent are described in Chapter 14. Annual estimates for municipal rates are allocated to quarters, and extrapolated for incomplete years, according to information about receipts of local government rates. The remaining expenses are estimated by linear trend. GOS for dwellings owned by private and public corporations is allocated to quarters on trend, and is deducted from GOS for total dwellings to derive estimates of GOS for dwellings owned by persons.

GENERAL GOVERNMENT

20.30 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 (i.e. an assumption is made in calculating the value of gross output that the net operating surplus is zero).

Annual estimates

20.31 Annual estimates of consumption of fixed capital at current prices for general government (general government GOS) are derived using a perpetual inventory model. This model and the source data used are described in detail in Chapter 16.

Quarterly estimates

20.32 Quarterly estimates are derived from the annual estimates by interpolation and extrapolation using a linear trend model.

NON-PROFIT INSTITUTIONS SERVING HOUSEHOLDS (NPISH)

20.33 SNA93 recommends, in its paragraph 7.9, that a GOS for NPISHs should be compiled on a similar basis to that described in paragraph 20.30 above for general government. However, in the ASNA, NPISHs are not distinguished as a separate sector, instead being included with the households sector. Consequently, no estimate is recorded for GOS of NPISHs although capital formation relating to NPISHs is indistinguishably included with that for unincorporated enterprises.

FINANCIAL CORPORATIONS AND QUASI CORPORATIONS

20.34 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 the case for 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.

20.35 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 SNA93 and the ASNA is to impute a service charge in addition to any actual charges which are made by these financial corporations, and to include the imputed service charge in the calculation of GOS. The imputed service charge is entitled financial intermediation services indirectly measured (FISIM).

20.36 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. The non-life insurance service charge is defined as premiums earned plus premium supplements less expected claims. 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. 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). Premium supplements do not include any income from the investment of insurance corporations' own funds. 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. While the use of expected claims rather than claims actually incurred each year may be viewed as a departure from the practical recommendations contained in SNA93, it is consistent with the conceptual discussion contained in SNA93.

20.37 For life insurance and pension funds the insurance service charge is equal to the administrative expenses of operating mutual funds plus the explicit charges made by non-mutual insurance corporations for the services they provide.

Annual estimates—financial intermediaries other than insurance corporations and pension funds

20.38 An estimate of GOS is calculated for financial intermediaries as a whole. The estimate includes the following financial intermediaries: banks (including the Reserve Bank), finance companies, pastoral finance companies, general financiers, money market corporations, building societies, credit unions, cash management trusts, securitisors, other financial corporations, investment companies, common funds, public unit trusts, public housing funds, co-operative housing societies, State government borrowing authorities, and industry development corporations of the Commonwealth government and the State governments.

20.39 GOS is calculated in the following manner:

FISIM imputation
plus explicit charges
plus gross non-land rent and other service income (excludes property income)
less expenses (excluding consumption of fixed capital)
less imputed financial service charges
plus capitalised software adjustment.

20.40 No FISIM is imputed for the Reserve Bank, other financial corporations, investment companies, common funds, publicly-listed unit trusts, public housing funds, co-operative housing societies, and industry development corporations of the Commonwealth and State governments. For the Reserve Bank a cost-based output measure is imputed instead of FISIM, and for publicly-listed unit trusts GOS is calculated as service fees plus non-land rent received less expenses. The treatment of the other financial intermediaries for which FISIM is not presently calculated will be reviewed to determine whether the concept of FISIM is relevant to any of them.

20.41 As indicated in paragraph 20.35 above, 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 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. 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 deposit multiplied by the difference between the 'pure' interest rate and the average interest rate paid on deposits. The 'pure' or 'reference' rate of interest could be determined as being equal to a particular market rate of interest, such as the long term bond rate. However, for practical reasons, the ABS has decided to use the mid-point between the average interest rate on loans and the average interest rate on deposits as the 'pure' or reference rate of interest for the FISIM calculations. The estimation of FISIM is undertaken at a broad level for particular categories of financial intermediaries.

20.42 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, as discussed in Chapter 4. Expenses include wages and salaries, purchases of goods and services, and taxes on production and imports. Profits and losses on foreign exchange dealings are excluded from GOS because they constitute holding gains and losses in the national accounts. Some of the imputed services for both FISIM and non-life insurance are attributable to corporations in the financial corporations sector, and need to be deducted as a component of intermediate consumption. An adjustment is also required to ensure that expenditure on software of a capital nature is not deducted as a current expense, but is capitalised.

20.43 Various ABS and other data sources are used to prepare the estimates of GOS for financial intermediaries. The principal data sources are the monthly *Reserve Bank of Australia Bulletin*, ABS annual Economic Activity Survey returns for banks, annual reports of individual financial enterprises, State Auditors'-General Reports and monthly, quarterly and annual ABS surveys conducted to produce statistics on the operations of the various types of financial intermediaries. Because of delays in the availability of data from some major sources, estimates for the most recent year are largely based on indicators derived from the ABS surveys, including *Managed Funds, Australia* (Cat. no. 5655.0) and the *Reserve Bank of Australia Bulletin*, which provide data on assets and liabilities of financial intermediaries. Data on interest rates, which are obtained from either the ABS surveys or the *Reserve Bank of Australia Bulletin*, are used in conjunction with the balance sheet data to estimate interest flows.

Annual estimates for insurance corporations and pension funds

20.44 Separate estimates are compiled for the GOS of non-life insurance corporations, and of life insurance corporations and pension funds.

20.45 GOS for non-life insurance corporations is estimated as the sum of the insurance service charge (as defined in paragraph 20.37 above) plus any explicit service charges plus gross rental income on dwellings and commercial buildings plus non-insurance business income plus subsidies less operating expenses (excluding the consumption of fixed capital) less consumption of imputed financial services plus the capitalised software adjustment. Estimates of the GOS of non-life insurance corporations are based on data from the reports of APRA, the Commonwealth Department of Family and Community Services, State Auditors-General, State insurance offices and the ABS Survey of Major Labour Costs.

20.46 GOS for life insurance corporations and pension funds is estimated as the insurance service charge (as defined in paragraph 20.37 above) plus gross rental income on commercial buildings less operating expenses (excluding the consumption of fixed capital) less consumption of imputed financial services plus the capitalised software adjustment. Estimates of the GOS of life insurance corporations and pension funds are based on data from the reports of APRA, State insurance offices and the ABS Survey of Superannuation Funds.

Quarterly estimates—all financial enterprises

20.47 At present there are no ABS surveys which provide direct quarterly estimates for the GOS of financial corporations. Consequently, the quarterly estimates are obtained by linear trend interpolation and extrapolation. It is expected that in future the ABS will be able to use quarterly data compiled by APRA from its new and redeveloped collections from financial corporations to prepare quarterly estimates of GOS for this sector.

CHAPTER 21 TAXES LESS SUBSIDIES ON PRODUCTION AND IMPORTS

INTRODUCTION

21.1 As discussed in Chapter 4, taxes on production and imports 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
- other taxes on production such as taxes on ownership or use of land, buildings, or other assets used in production, or on the labour employed, or on labour costs.

Taxes on production and imports include the GST (from 1 July 2000), wholesale sales taxes (prior to 1 July 2000), excise taxes, payroll taxes, land taxes, local government rates, motor vehicle registration charges paid by businesses, and customs duties.

21.2 Subsidies are defined in Chapter 4 as 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. Payments to public corporations and quasi corporations to compensate for recurring losses are also included. However, payments made to public corporations and quasi corporations to compensate for non-recurring losses are excluded from subsidies and are included as a (negative) contribution to general government sector property income in the form of dividends.

21.3 Subsidies are not payable to final consumers. 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 (see Chapter 22 for further information on social benefits in kind). Social benefits in kind include medicare payments, whether paid directly to doctors who bulk bill in respect of services provided to their patients or paid as cash refunds to patients. 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.

INTRODUCTION *continued*

21.4 Taxes less subsidies on production and imports may be disaggregated into two components: taxes less subsidies on products, and other taxes less subsidies on production. 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. Local government rates are included in other taxes on production, whether paid by landlords or owner-occupiers. In the national accounts owner-occupiers are regarded as running a business in which they rent the dwelling to themselves as consumers, and generate a gross operating surplus which is derived as the difference between imputed rent and the intermediate costs associated with providing dwelling services, such as maintenance, rates, and insurance and financial services.

21.5 Taxes on products are taxes payable on goods and services when they are produced, delivered, sold, transferred or otherwise disposed of by their producers; they include taxes and duties on imports that become payable when goods enter the economic territory or when services are delivered by non-resident units. Other taxes on production consist mainly of taxes on the ownership or use of land, buildings or other assets used in production or on the labour employed, or compensation of employees paid.

21.6 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 estimates

21.7 For Commonwealth and State general government taxes and subsidies, data are extracted from administrative sources such as Commonwealth and State budget papers and Auditors'-General Reports, Commonwealth Department of Finance and Administration ledgers and supplementary departmental documents. For local government, the information is obtained by means of a joint ABS/Commonwealth Grants Commission annual return, which is collected from each local government authority.

21.8 Some production taxes paid by primary producers are not paid in the same year as the year in which the taxed goods are produced. This is also the case for some subsidies received by primary producers. In these cases the production taxes and subsidies are estimated on a payable basis. Receipts of fringe benefits tax (introduced in late 1986) are also adjusted to a payable basis. Annual estimates of production taxes and subsidies on a payable basis are derived by summing the four quarterly estimates. (The method of adjustment to a payable basis is discussed in the section below on quarterly estimates.)

Quarterly estimates

21.9 Information about Commonwealth and State general government production taxes and subsidies is extracted 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. Quarterly data for local government rates are collected from a sample of local government authorities.

21.10 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, any wheat subsidy arising from the difference between the guaranteed minimum price and the net pool return rate is allocated to quarters on the basis of the gross value of production in the year to which the payment relates.

21.11 Fringe benefits are payable on the benefits paid to employees for financial years ended 31 March each year, although the actual quarterly payments are not directly related to the benefits paid in that quarter. As no specific information is available on the actual quarterly incidence of fringe benefits the annual liability data for years ended 31 March, which are obtained from the ATO, are allocated to quarters using linear trend interpolation (see Appendix 6). The accrual adjustment is therefore equal to the derived accrual value less the actual fringe benefits collected in the quarter.

CHAPTER 22 PROPERTY INCOME AND SECONDARY INCOME FLOWS

INTRODUCTION

22.1 As discussed in Chapter 4, income flows may be divided into primary income and secondary income. Primary income comprises compensation of employees (see Chapter 19), gross operating surplus and gross mixed income (see Chapter 20), taxes less subsidies on production and imports (see Chapter 21), and property income. Secondary income flows relate entirely to current transfers of income from one institutional sector to another (other than those included in primary income) and include current taxes on income, wealth etc., social contributions and benefits, and miscellaneous current transfers.

22.2 As also discussed in Chapter 4, property income represents transfers of income resulting from the use of financial assets and tangible non-produced assets such as land and sub-soil assets. It includes interest, dividends (including withdrawals of equity from quasi corporations), imputed property income, rent on natural assets and reinvested earnings on direct foreign investment. Miscellaneous current transfers include non-life insurance premiums and claims, current transfers within general government (e.g. grants from one level of government to another), current transfers between the Commonwealth government and governments of other countries or international organisations (e.g. UN, OECD), current transfers from general government and public non-financial corporations to private non-profit institutions serving households, fines and penalties, and compensation paid (other than as an insurance claim) for injury, property damage or death.

22.3 This chapter discusses the sources and methods for compiling estimates for the various types of property income and the various categories of secondary income.

PROPERTY INCOME

22.4 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. Due to data limitations, all property income receipts by the household sector are classified to households, with no receipts being attributed directly to unincorporated trading enterprises.

22.5 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 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. These implicit service charges are entitled 'financial intermediation services indirectly measured' (FISIM). 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 'pure' or 'reference' rate of interest could be determined as being equal to a particular market rate of interest, such as the long term bond rate. However, for practical reasons, the ABS has decided to use the mid-point between the average interest rate on loans and the average interest rate on deposits as the 'pure' or 'reference' rate of interest for the FISIM calculations. The estimation of FISIM is undertaken at a broad level for particular categories of financial intermediaries. The interest flows recorded in the sector 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).

22.6 Property income flows also include imputed flows relating to life insurance, superannuation and non-life insurance operations. Three distinct categories of such flows are included in the sector income accounts. First, imputed interest from life insurance and superannuation funds to households is recorded covering the current income earned by statutory funds on behalf of policy holders. This income mainly comprises interest 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 sector financial accounts from households back to the funds (recorded as Net equity of households in reserves under the category Insurance technical reserves). Second, imputed interest from the general government sector to households is recorded on account of the unfunded superannuation schemes operated by the general government sector (see paragraphs 22.48 to 22.52 for more details on the treatment of these unfunded

superannuation schemes). Third, premium supplements are recorded as an imputed property income flow from non-life insurance corporations to policy holders. As discussed in Chapter 20, premium supplements represent income earned on the technical reserves of non-life insurance corporations, which consists 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.

22.7 The item Dividends payable to general government by public corporations (or quasi corporations) records 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. The item includes (with a negative sign) income transfer payments made by general government to offset non-recurring losses of public corporations and quasi corporations.

22.8 Reinvested earnings on direct foreign investment payable to and receivable from non-residents are recorded as separate components of property income flows in the external income account and the sector income accounts for both non-financial corporations and financial corporations. The item Reinvested earnings represents the undistributed income of a direct investment enterprise which is attributable to its direct investor in another economy. In effect retained earnings are treated as if they were distributed and remitted to foreign direct investors in proportion to their ownership of the equity of the enterprise, and then reinvested by them. Hence they are imputed transactions, with offsetting entries being recorded in property income flows in the external income account and the 'shares and other equity' items in the external financial account. 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.

22.9 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 provision for corporate taxes and consumption of fixed capital.

Annual estimates

22.10 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.

22.11 Available data sources do not provide complete information on the origin or destination of property income flows. Data for individual matrix cells are completed where possible using direct information from either party to the transaction. Where such information is not available, cells are completed using indirect indicators or are derived as a balance. Totals are either estimated directly from source data or are derived by aggregation.

22.12 Interest and dividend flows are derived using a large number of data sources. These include ABS surveys of different types of financial corporations, information provided by the Reserve Bank of Australia, the Australian Prudential Regulatory Authority (APRA), ABS balance of payments, financial accounts and government finance statistics, Taxation Statistics produced by the Australian Taxation Office, the ABS Company Profits Survey, and State Auditors'-General reports. Estimates for the latest year are based on less complete data than those for earlier years.

22.13 Wherever possible actual interest flows are initially used to construct the interest matrix. However, because there is insufficient data on interest flows by instrument and counterparty, indirect estimation methods are used to complete the full matrix. Average interest rates are applied to sectoral balance sheet information to derive the detailed estimates of interest flows by instrument and counterparty. 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.

22.14 Estimates for reinvested earnings are obtained directly from balance of payments statistics. The quarterly Survey of International Investment provides data on reinvested earnings on direct foreign investment, both payable to non-residents and receivable from non-residents. 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).

22.15 Land rent is mainly paid by corporations and unincorporated enterprises, and received by general government, public corporations and persons. Major data sources used are the government administrative records used to compile government finance statistics and the ABS Agricultural Finance Survey. Land rent received by persons is derived as a balance. Separate estimates are made for rent on natural resource assets.

Quarterly estimates

22.16 Sufficient quarterly data are not currently available to enable a detailed matrix approach to be used for the compilation of quarterly estimates.

22.17 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. Property income received from and paid to non-residents is obtained from balance of payments statistics.

22.18 The principal data source used to compile quarterly estimates of household property income is the monthly *Reserve Bank of Australia Bulletin*. Indicator data are estimated by multiplying estimates of loans outstanding by appropriate interest rates. Available data for loans outstanding often relate to a broader borrowing sector than that for which the estimates are required. The use of these data requires the assumption that movements in available data for loans outstanding are representative of movements in the narrower sector for which estimates are being prepared. For interest paid on dwellings owned by persons, data relating to advances for housing are generally readily available, but for interest paid by unincorporated enterprises, source data generally relate to loans outstanding for a much broader sector of activity.

22.19 Quarterly estimates of net property income payable by the agricultural sector are interpolated between and extrapolated from the annual estimates using a linear trend model.

CURRENT TAXES ON INCOME, WEALTH ETC.

22.20 There are two components to current taxes on income, wealth etc., namely income taxes and other current taxes on income, wealth etc. 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 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 sector capital accounts). Income tax payable by both non-financial corporations and financial corporations is recorded on an accrual basis, with their income tax payable being 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 the resources rent tax and income tax on the earnings of superannuation funds. 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. The Medicare levy is treated as an integral part of income tax payable by the household sector. 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 sector income accounts. 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 (see Chapter 23).

22.21 The item 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. 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.

Annual estimates

22.22 The starting point for estimates of income tax payable by corporations is net tax assessed on companies from Taxation Statistics. As this source does not make sufficient distinction between institutional sectors, estimates for some financial corporations are based on income tax provisions recorded in the ABS surveys of the different types of financial institutions. For those public non-financial corporations and quasi corporations that are liable to pay income tax, income tax payable is estimated using data published in their annual reports. Income tax payable by private non-financial corporations is estimated as the residual after deducting the estimates of income tax payable by other sectors from estimates of total net tax assessed on companies. Adjustments are made for amendments to net tax assessed as a result of processing late taxation returns and audit activity by the Australian Taxation Office. Income tax payable by individuals, and by partnerships and trusts, is obtained from the Commonwealth Department of Finance and Administration Ledgers. Tax collections under the Prescribed Payments Scheme are allocated between households and corporations.

22.23 To estimate other current taxes on income, wealth etc. it is necessary to allocate between households and businesses the revenue collected for licences to own or use vehicles, boats or aircraft, and for licences to hunt, shoot or fish. Revenue for licences collected from households is included in current taxes on income, wealth etc, while licence revenue from businesses is included in taxes on production and imports.

22.24 Current taxes on income, wealth etc. receivable from non-residents are estimated from data relating to withholding taxes obtained from the Australian Taxation Office. Withholding taxes include those on dividends, interest, royalties and insurance income. Until 1995–96, current taxes on income, wealth etc. payable to non-residents were sourced from data relating to interest and dividend withholding taxes from the Survey of International Investment; they have been extrapolated since that year using movements in the relevant transactions.

Quarterly estimates

22.25 Quarterly estimates for all components of income taxes and other current taxes on income, wealth etc. are compiled using information from administrative sources such as the Commonwealth Department of Finance and Administration Quarterly Ledgers, and State government monthly and quarterly statements of receipts and expenditure.

SOCIAL CONTRIBUTIONS AND SOCIAL BENEFITS

22.26 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: social insurance benefits and social assistance benefits. 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 it. 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.

22.27 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.

Annual estimates

22.28 Annual estimates of social contributions for workers' compensation and social benefits from workers' compensation are compiled using data supplied by APRA, periodic ABS Major Labour Cost Surveys and annual ABS Economic Activity Surveys. Social assistance benefits are obtained directly as a by-product of the ABS government finance system.

Quarterly estimates

22.29 Quarterly estimates of social contributions for workers' compensation and social benefits from workers' compensation are compiled by allocating annual estimates for the private and public sectors separately using wages and salaries as the indicator. Quarterly estimates of social assistance benefits are compiled using information from administrative sources such as the Commonwealth Department of Finance and Administration Quarterly Ledgers, and State government monthly and quarterly statements of receipts and expenditure.

NET NON-LIFE INSURANCE PREMIUMS AND NON-LIFE INSURANCE CLAIMS

22.30 The premiums charged by non-life insurance corporations can be regarded as comprising two components: an implicit service charge, and a transfer payment to cover the risk of providing insurance cover. 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. 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. While the use of expected claims rather than claims incurred each year may be viewed as a departure from the practical recommendations contained in SNA93, it is consistent with the conceptual discussion contained in SNA93.

22.31 Net non-life insurance premiums are defined as non-life insurance premiums 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 sector 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 sector income accounts as transfers from non-life insurance corporations to other institutional sectors.

22.32 Health insurance funds are treated as part of the non-life insurance sub-sector, 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. Although the operating surplus generated by workers' compensation business is included in the gross operating surplus for the financial corporations sector, 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 (see paragraph 22.26).

NET NON-LIFE INSURANCE PREMIUMS AND NON-LIFE INSURANCE CLAIMS *continued*

Annual estimates

22.33 Annual estimates for net premiums and claims for non-life insurance (excluding health insurance funds) are compiled using data published in the APRA publication *Selected Statistics on the General Insurance Industry* and from balance of payments statistics. Similarly, annual estimates for net non-life insurance premiums and non-life insurance claims for health insurance funds are compiled using data published in the Private Health Insurance Administration Council publication *Operations of the Registered Health Benefits Organisations*.

Quarterly estimates

22.34 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

22.35 In addition to the current transfers discussed above there are a number of miscellaneous current transfers recorded in the ASNA. The following categories of transfers are identified and recorded separately: Current transfers to non-profit institutions serving households; Current transfers from the Commonwealth government to State and local government; and Current international cooperation. The remaining miscellaneous current transfers are recorded as Other current transfers in the sector income accounts.

22.36 Current transfers to non-profit institutions serving households 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 and not as government final consumption expenditure. 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.

22.37 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.
- These transfers appear only in the subsector income accounts for national, and for State and local general government.

MISCELLANEOUS CURRENT TRANSFERS *continued*

22.38 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.

22.39 Other current transfers to non-residents include social assistance benefits payable to non-residents by the Commonwealth government, personal transfers, transfers of emigrants' funds 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 funds transferred to Australia by immigrants, social security benefits paid by foreign governments through the Commonwealth government to residents, and gifts, donations, legacies, other pensions etc.

22.40 Fines are recorded as part of Other current transfers payable to general government from other institutional sectors in the sector income accounts. Fines are civil and criminal penalties imposed on law breakers, other than penalties imposed by taxation authorities (which are regarded as taxes).

22.41 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.

Annual estimates

22.42 Estimates of current international cooperation are obtained from Commonwealth Department of Finance and Administration Ledgers. Estimates of miscellaneous current transfers between general government and the other institutional sectors are obtained as a by-product of the compilation of ABS government finance statistics. 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 Administration Ledgers and supplementary departmental documents. A joint ABS/Commonwealth Grants Commission annual return, which is collected from each local government authority, provides the details required for local government. Estimates for all public non-financial corporations and quasi corporations are based on annual financial statements and Auditors'-General Reports.

MISCELLANEOUS CURRENT TRANSFERS *continued*

22.43 Other current transfers to and from non-residents are obtained directly from balance of payments statistics. Commonwealth Budget Papers provide data on Commonwealth government veterans' and social security pensions paid to former Australian residents now living abroad. Other private sector transfers to non-residents are estimated using data from the Survey of Foreign Unrequited Transfers. 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). 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).

Quarterly estimates

22.44 Quarterly estimates of miscellaneous current transfers between general government and the other institutional sectors 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. Current transfers to and from non-residents are obtained directly from balance of payments statistics.

SOCIAL TRANSFERS IN KIND

22.45 This is a new category of transfers that was introduced when SNA93 was implemented. It was introduced to facilitate the formation of two new concepts of final consumption expenditure, namely Actual individual consumption and Actual collective consumption (see Chapter 14 for definitions of these items). Social transfers in kind are recorded in two supplementary accounts, the general government adjusted disposable income account and the household adjusted disposable income account. In the ASNA social transfers in kind are individual goods and services provided to individual households by general government units. The goods and services may be produced by the government units or purchased by them. Also included are reimbursements made to individual households by general government units for purchases by the households under a scheme that authorises the purchase of approved goods and services (e.g. Medicare rebates for medical services).

22.46 In the ASNA private non-profit institutions serving households are combined with households in the households institutional sector. However, if (as recommended in the SNA93) NPISHs were classified to a separate institutional sector of their own, their entire final consumption expenditure would be treated as actual individual consumption and recorded as social transfers in kind to households.

SOCIAL TRANSFERS IN KIND continued

Annual estimates

22.47 Estimates of social transfers in kind are obtained as a by-product of the compilation of ABS government finance statistics. 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 Administration Ledgers and supplementary departmental documents. A joint ABS/Commonwealth Grants Commission annual return, which is collected from each local government authority, provides the details required for local government.

GENERAL GOVERNMENT UNFUNDED SUPERANNUATION SCHEMES

22.48 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.

22.49 In conjunction with the implementation of SNA93, the treatment of unfunded superannuation schemes was changed in the ASNA. The actual payment of pensions to former employees, which had previously been included in both compensation of employees and government final consumption expenditure, was replaced by an imputed estimate for unfunded employer contributions to superannuation. The value of these imputed contributions was 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 was introduced into the income accounts of general government and households for imputed interest on the accruing liability to pay unfunded superannuation.

22.50 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.

GENERAL GOVERNMENT UNFUNDED SUPERANNUATION SCHEMES *continued*

22.51 A brief description of the model which is used to calculate imputed employer contributions and imputed property income flows for periods up to 1997–98 is provided in Appendix A to this chapter. The major data sources used to compile these estimates are data on 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.

22.52 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.

APPENDIX A Explanation of how the unfunded superannuation model works

A.1 The model was set up to estimate (i) accrued superannuation expense, and (ii) accrued interest on the nominal superannuation debt for the general government sector for all jurisdictions for periods up until 1997–98.

A.2 For each accounting period the following identity should hold (no allowance is made for valuation changes which could arise if different assumptions were used in the actuarial calculations from one period to another. In general the latest available assessment of the liabilities of the unfunded schemes is taken as the most reliable estimate):

Liability at beginning of year
plus Accrued employer expense
plus Accrued interest on the liability
minus Cash payments of benefits
equals Liability at end of year

A.3 From the equation above:

accrued expense + accrued interest - cash payments = net increase in superannuation liability.

Sources of data and methods of calculation

Liability at end of period	For 1997–98 unfunded employee entitlements were taken from the 1998–99 issue of Government Financial Estimates, Australia (Cat. no. 5501.0) (i.e. the outstanding balance reported by State and Commonwealth Treasuries). For the Commonwealth, an adjustment is made for claims on general government for unfunded liabilities relating to public non-financial corporations. For earlier periods, the liability at end of period is calculated by deducting the net increase in superannuation liability in the following period.
Accrued employer expense	For the Commonwealth, a weighted average of implicit employer contribution rates for different schemes is calculated. These employer contribution rates are based on data from the Commonwealth Actuary for 1988, 1993 and 1996, with contribution rates for other years being estimated. For each year, this average contribution rate is applied to ABS estimates of public sector wages and salaries. For all other jurisdictions, accrued expense is calculated as a residual such that the sum of expenses plus interest minus payments equals the increase in liabilities for each year and also equals the relevant unfunded liability estimate for the latest period.

Accrued interest on the liability	For each accounting period, the discounted Commonwealth long term bond rate was applied to the beginning of period liability. This discounted rate has been calculated by applying a discount factor to the bond rate each year so that the end point agrees with the unfunded employee entitlements data for the current period (i.e. for the Commonwealth, accrued interest is calculated as a residual). This discounted Commonwealth rate is then used in the calculation of accrued interest for all other jurisdictions.
Cash payments of benefits	Cash pensions and lump sums paid in respect of unfunded employee superannuation available from government finance statistics.

CHAPTER 23 CAPITAL TRANSFERS

INTRODUCTION

23.1 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. As discussed in Chapter 4, a capital transfer is one in which the (i) ownership of an asset (other than cash or inventories) is transferred from one institutional unit to another (i.e. a capital transfer in kind); or (ii) cash is transferred to enable the recipient to acquire another asset; or (iii) the funds realised by the disposal of an asset are transferred. The first category of capital transfers includes cancellation of liabilities by mutual agreement between creditor and debtor, sometimes known as 'debt forgiveness'. However, the writing off of 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, the writing off of debt should be recorded in the other changes in the volume of assets account of the creditor and debtor. 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). The second category of capital transfers 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.

23.2 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.

23.3 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);

INTRODUCTION *continued*

- 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 colleges of advanced education, government and non-government schools, teaching hospitals, public housing and roads; and
- direct capital grants to local government authorities.

23.4 The only capital taxes in Australia are inheritance and gift duties. In the late 1970s, their value started to decline considerably and they are insignificant at the time of writing.

23.5 Capital transfers to non-residents comprise Commonwealth general government foreign aid in the form of the provision of capital assets, and migrants' transfers in respect of former residents emigrating from Australia. Capital transfers from non-residents comprise migrants' transfers in respect of individuals who are emigrating to Australia. 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.

23.6 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 households or corporations to non-profit institutions to finance gross fixed capital formation are also included.

SOURCES AND METHODS

Annual estimates

23.7 Estimates of all capital transfers between general government and the other institutional sectors are obtained as a by-product of the compilation of ABS government finance statistics. 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 Administration Ledgers and supplementary departmental documents. A joint ABS/Commonwealth Grants Commission annual return, which is collected from each local government authority, provides the details required for local government.

SOURCES AND METHODS
continued

23.8 Capital transfers to and from non-residents are obtained directly from balance of payments statistics. Commonwealth government foreign aid transfers of a capital nature are identified from the transactions recorded in the Department of Finance and Administration Ledgers. Migrants' transfers to non-residents are estimated by applying per capita transfers, derived from the Survey of Foreign Unrequited Transfers, to the number of persons emigrating from Australia obtained from overseas arrivals and departures data. Survey data for per capita transfers are extrapolated using average weekly earnings data. Migrants' transfers from non-residents are estimated using data from the Department of Immigration and Multicultural Affairs concerning the Business Skills Category of immigrants, overseas arrivals and departures data on the number of migrants entering and leaving Australia and estimated per capita transfers (non-business) from the Survey of Foreign Unrequited Transfers. 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).

Quarterly estimates

23.9 On a quarterly basis, only estimates of capital transfers to and from non-residents are published. These estimates are taken directly from balance of payments statistics compiled using the same sources as for the annual estimates outlined in paragraph 23.8.

CHAPTER 24 VALUE ADDED BY INDUSTRY

MEASURES AT CURRENT PRICES

24.1 Estimates of gross value added are derived at basic prices. The sum of gross value added across all industries plus taxes less subsidies on products equals GDP which is valued at purchases' prices. The current price estimates of gross value added by industry are only produced annually. For years prior to 1994–95 the estimates were derived for the most part using the income approach only. For years from 1994–95 they have been derived in an input-output framework and are in balance with the expenditure estimates for all years prior to the latest complete financial year. The sources and methods used to derive these estimates are spelt out in Chapter 12.

VOLUME MEASURES

24.2 Quarterly chain volume measures of gross value added by industry are published in the quarterly *Australian National Accounts: National Income, Expenditure and Product* (Cat. no. 5206.0). These measures 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. From 1995–96 the annual benchmarks are obtained from supply and use (S-U) tables compiled in the prices of the previous year. The sources and methods used to derive these benchmarks are described in Chapter 12. For years prior to 1994–95 the annual benchmarks were derived using sources and methods detailed in the previous edition of this manual. The following descriptions of sources and methods relate mainly to the means by which quarterly chain volume indicators of gross value added are calculated. The specific statistical procedures used generally to calculate chain volume measures are outlined in Chapter 10.

24.3 Quarterly chain volume indicators of gross value added in the Australian national accounts are derived using three different methods:

- the output indicator method;
- double deflation; and
- the input indicator method.

The method selected to obtain chain volume measures for a particular industry depends on the data available in respect of that industry.

24.4 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. In a few cases the output indicator is just a single statistic, but in most cases it is a composite 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).

VOLUME MEASURES
continued

24.5 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.

24.6 Double deflation requires that, before chaining, volume measures of intermediate input are subtracted from volume measures of output, both valued in the prices of the previous year. This method is used for Agriculture. The third 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 Defence, Education, Health and Community Services, and Property and Business Services; it is also used in part for Personal and Other Services.

24.7 The volume estimates of gross value added for each industry are derived in the prices of the previous year. Chaining takes place after aggregation.

24.8 For a description of the industries appearing in this section see Appendix 1 (Classifications). The industry classification used is the *Australian and New Zealand Standard Industrial Classification* (ANZSIC) (1993 edition). The ANZSIC codes are shown, where appropriate, in brackets after each industry and component title. A description of the special national accounts 'industry' Ownership of Dwellings is included in Chapter 20.

SOURCES AND METHODS

24.9 Tables 24.1 to 24.19 set out the data sources and methods used to derive quarterly chain volume measures of gross value added for the industries published in Cat. no. 5206.0.

24.1 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—AGRICULTURE, FORESTRY AND FISHING (DIVISION A)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Sum of estimates for *Agriculture* (01) and *Services to Agriculture* (021), *Hunting and Trapping* (022) *Forestry and Logging* (03) and *Commercial Fishing* (04), as described below.
Agriculture (01) and Services to Agriculture (02)	
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 estimate.
Output	Volume measures of output in the prices of the previous year for most commodities are derived by quantity revaluation. The sources of current price estimates and quantity data used to derive those volume measures of outputs are detailed in Chapter 20. 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 input	The sum of marketing costs, fodder, seed, fertiliser and other intermediate inputs (fuel, maintenance of plant and structures, chemicals, insurance, etc.), as described below. The sources of current price estimates and quantity data used to derive volume measures of these inputs are detailed in Chapter 20.
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 adding the results together.
Fodder, seed	Manufactured fodder is revalued by components of *Price Indexes of Articles Produced by Manufacturing Industry, Australia* (Cat. no. 6412.0). All other components are revalued 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.
Fertiliser	Volume estimates in the prices of the previous year are derived by quantity revaluation.
Other intermediate inputs	Current price estimates are revalued using the relevant component indexes of *Index of Prices Received and Paid by Farmers* (Australian Bureau of Agricultural and Resource Economics).
Forestry and Logging (03), Commercial Fishing (04)	
Gross value added	Output indicator method is used both *Forestry and Logging* (03) and *Commercial Fishing* (04), as described below.
Output	
Forestry and logging (03)	Volume estimates in the prices of the previous year are derived by quantity revaluation using production data for softwood, hardwood and sleepers as published in *Timber Supply Review* (Australian Bureau of Agricultural and Resource Economics). The current price estimates are derived from data contained in Forest Products Statistics (Australian Bureau of Agricultural and Resource Economics).
Commercial fishing (04)	Quarterly volume measures are derived by linear trend interpolation of annual estimates. Annual estimates for this purpose are obtained by quantity revaluation of the major commodities using quantity data from Agriculture and Resources Quarterly (Australian Bureau of Agricultural and Resource Economics).

24.2 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—MINING (DIVISION B)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Sum of estimates for Mining (excluding Services to Mining) (11 to 14) and Services to Mining (15) as described below.
Mining (excluding Services to Mining) (11 to 14)	
Gross value added	Output indicator method. Volume measures of output in the prices of the previous year are derived for major ANZSIC classes by quantity revaluation using production estimates. Output estimates are calculated for the following ANZSIC classes: 1101, 1102, 1200 and 1311 to 1319. The remaining ANZSIC classes are assumed to have the same combined growth rate as these ANZSIC classes. The production estimates used are obtained from data contained in *Quarterly Mineral Statistics* (Australian Bureau of Agricultural and Resource Economics) and *Australian Mining Industry* (Cat. no. 8414.0). Prior to chaining, volume estimates of value added in the prices of the previous year are obtained for each of the eleven classes referred to above. These are then summed and chained.
Services to Mining (15)	
Gross value added	Output indicator method. There are no industry based statistics relating to Services to Mining (15) available for gross value added estimation. As activity in this industry is largely in the area of exploration, the data used for current price value estimation are obtained from *Mineral and Petroleum Exploration, Australia* (Cat. no. 8412.0). Private exploration on production leases is excluded, since that activity is recorded as an input item by mining establishments in the Census of Mining Establishments in the Census of Mining Establishments. While the bulk of the Services to Mining industry comprises exploration activity, the data in *Mineral and Petroleum Exploration, Australia* (Cat. no. 8412.0) will overstate activity in the industry to the extent that they include activity undertaken by establishments not classified to this industry (e.g. the services of chartered aircraft). Conversely, the data in Cat. no. 8412.0 will understate activity in the industry to the extent that they exclude activity by establishments in the Services to Mining industry not engaged in exploration (e.g. contract drillers operating on production leases). Current price value estimates are revalued by a fixed-weighted index consisting of price indexes of motor vehicle parts and equipment, mining and drilling machinery taken from Price Indexes of *Articles Produced by Manufacturing Industry* (Cat no. 6412.0) and *Import Price Index* (Cat. no. 6414.0), *Price Index of Materials Used in Building Other than House Building, Six State Capital Cities* (Cat. no. 6408.0), and wage rates in the mining and quarrying industry taken from *Wage Cost Index* (Cat. no. 6345.0).

24.3 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—MANUFACTURING (DIVISION C)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	The output indicator method is applied at the subdivision level. Chain volume measures of gross value added for total Manufacturing and each of its nine subdivisions are derived in a three step process. (i) Estimates of output in the prices of the previous year are derived for each subdivision by combining estimates of sales of manufactured goods, other operating revenue (where significant) and changes in the level of inventories of finished goods and work-in-progress. (ii) These estimates of output in the prices of the previous year are then used to extrapolate the previous year's current price values of gross value added (or the latest current price values when these are unavailable) to obtain estimates of gross value added in the prices of the previous year. (iii) Chain volume estimates of gross value added are then formed for each subdivision. The subdivision estimates in the prices of the previous year are summed and then chained to form chain volume estimates for total Manufacturing. Current price estimates for each of the output components are obtained from a quarterly survey of private enterprises, conducted by the ABS. Volume measures, in the prices of the previous year, of petroleum and coal output in the Petroleum, Coal, Chemical and Associated Product Manufacturing industry are obtained by revaluing quantity data for a range of petroleum and coal products, published in *Australian Petroleum Statistics* (Department of Industry, Science and Resources (DISR)). Volume measures of all components of output in all other industry groups and the remaining components in the Petroleum, Coal, Chemical and Associated Product Manufacturing industry are derived, in the prices of the previous year, by deflation using fixed weighted price indexes consisting mainly of components of *Price Indexes of Articles Produced by Manufacturing Industry, Australia* (Cat. no. 6412.0) and *Price Indexes of Materials Used in Manufacturing Industries, Australia* (Cat. no. 6411.0).

24.4 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—ELECTRICITY, GAS AND WATER SUPPLY (DIVISION D)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Sum of gross value added estimates for Electricity Supply (361), Gas Supply (362) and Water Supply, Sewerage and Drainage Services (37), as described below.
Electricity Supply (361)	
Gross value added	Output indicator method. The output indicator is the quarterly quantity of electricity produced, published in *Manufacturing Production, Australia (Preliminary)* (Cat. no. 8301.0).
Gas Supply (362)	
Gross value added	Output indicator method. The output indicator is the quarterly quantity of gas available through mains, as published in *Manufacturing Production, Australia* (Cat. no. 8301.0).
Water Supply, Sewerage and Drainage Services (37)	
Gross value added	Output indicator method. The output indicator is obtained by quantity revaluation of data supplied by a selection of State and local government authorities.

24.5 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—CONSTRUCTION (DIVISION E)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Output indicator method. Volume measures of the value of work done in the prices of the previous year are derived by the revaluation of current price estimates from *Building Activity, Australia* (Cat. no. 8752.0) and *Engineering Construction Activity, Australia* (Cat. no. 8762.0) at a very detailed level. They are then summed to the five aggregates below, and weighted together using value added data from the 1988–89 Construction Industry Survey. • house construction; • alterations and additions to dwellings; • non-house dwelling construction; • non-dwelling building; and • non-building construction. For details of the deflators used to revalue the current price estimates of the value of work done, refer to the description of the volume measurement of the construction components of gross fixed capital formation (Chapter 15).

24.6 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—WHOLESALE TRADE (DIVISION F)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Output indicator method. The output indicator is derived by weighting together volume measures of wholesale turnover using value added weights from the 1991–92 Wholesale Trade Survey and from annual Economic Activity Surveys. The wholesale turnover data used are current price data taken from *Inventories and Sales, Selected Industries* (Cat. no. 5629.0). As these sales estimates only include those made by private firms, sales by public marketing authorities (obtained from ABS Public Finance Statistics) are also included. An exception is made in the case of petroleum wholesale sales, where quantity data from DISR are used as a volume indicator. As there are no readily available wholesale price indexes, the deflators used to convert current price wholesale sales into volume measures are obtained by weighting together manufacturing output price indexes and import price indexes taken from *Price Indexes of Articles Produced by Manufacturing Industry* (Cat. no. 6412.0) and *Import Price Index* (Cat. no. 6414.0).

24.7 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—RETAIL TRADE (DIVISION G)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Output indicator method. The output indicator is derived by weighting together volume measures of turnover using value added weights. These weights are obtained from the 1991–92 Census of Retail Establishments and from annual Economic Activity Surveys. The volume estimates of retail turnover are derived through revaluation (using price data largely from *Consumer Price Index* (Cat. no. 6401.0)) of current price estimates of industry turnover published in *Retail Trade, Australia* (Cat. no. 8501.0) and data on new motor vehicle registrations and motor vehicle operations (see Chapter 14 for further details).

24.8 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—ACCOMMODATION, CAFES AND RESTAURANTS (DIVISION H)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Output indicator method. Volume measures of output are constructed from data on cafes and restaurants, and tourist accommodation. Turnover for cafes and restaurants from *Retail Trade, Australia* (Cat. no. 8501.0), is revalued by a component of the CPI. For accommodation, the number of guest nights from *Tourist Accommodation, Australia* (Cat. no. 8635.0) is quantity revalued.

24.9 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—TRANSPORT AND STORAGE (DIVISION I)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Incorporates chain volume measures of gross value added for Road Transport (61), Rail, Pipeline and Other Transport (62 and 65), Water Transport (63), Air and Space Transport (64), and Transport Services and Storage (66 and 67).
Road Transport (61)	
Gross value added	Combines volume measures of Road Freight Transport (611), Long Distance Bus Transport (6121), Short Distance Bus Transport (Including Tramway) (6122), and Taxi and Other Road Passenger Transport (6123).
Road Freight Transport (611)	Output indicator method. At present there are no suitable quarterly output statistics for road freight. The output statistics used are volume estimates of wholesale turnover (see entry for Wholesale Trade above). These are weighted together using transport margins.
Long Distance Bus Transport (6121) and Short Distance Bus Transport (Including Tramway) (6122)	Output indicator method. Current price estimates of household final consumption expenditure on bus and tram transport are revalued by components of *Consumer Price Index* (Cat. no. 6401.0) to form an output indicator.
Taxi and Other Road Passenger Transport (6123)	Output indicator method. Current price estimates of household final consumption expenditure on taxi transport are revalued by components of *Consumer Price Index* (Cat. no. 6401.0) to form an output indicator.
Rail, Pipeline and Other Transport (62 and 65)	Combines volume measures for *Rail Transport* (62) and *Pipeline and Other Transport* (65).
Rail Transport (62)	
Gross value added	Combines volume measures for public and private rail gross value added, as described below.
Public rail services	Output indicator method. The output indicator comprises volume measures of expenditure on passenger and freight services combined. Volume measures of expenditure on passenger services are derived by deflation of estimates of household final consumption expenditure on rail fares using components of *Consumer Price Index* (Cat. no. 6401.0). Volume measures of expenditure on freight services are derived by extrapolating revenue in the reference year using tonne-kilometres of freight carried, obtained from the State and Commonwealth rail authorities.
Private rail services	Output indicator method. The output indicator is quantity of freight carried. The quarterly estimates of quantity are derived by interpolating and extrapolating annual tonnes of freight carried, obtained from *Australian Non-Government Railways: Operating Statistics (*Department of Transport and Regional Services), using a quarterly index of private rail activity published in Transport Indicators (Department of Transport and Regional Services).
Pipeline and other Transport (65)	No quarterly data are collected for this industry. A reference year estimate of gross value added is extrapolated by the measure for rail transport.
Water Transport (63)	
Gross Value Added	Output indicator method. The output indicator is formed from quantities of cargo (coastal and overseas) carried by Australian registered vessels, measured in revenue tonnes and weighted by the revenue earned in the reference year. The quarterly estimates of quantities of cargo carried by Australian registered vessels are collected from six major ports, namely Sydney, Melbourne, Fremantle, Brisbane, Adelaide and Gladstone.
Air and Space Transport (64)	
Gross Value Added	Output indicator method. Output is measured by a volume measure of passenger, freight and mail revenues of major airlines. Volume measures of passenger traffic revenue, and freight and mail traffic revenues combined, are obtained by extrapolating reference year revenue using data on passenger-kilometres and tonne-kilometres, respectively (where tonne-kilometres data are unavailable, tonnes data are used). Revenue and quantity data are obtained from the major airlines and from the Department of Transport and Regional Services.

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24.9 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—TRANSPORT AND STORAGE (DIVISION I)—*continued*

Industry/Aggregate/Item	Data sources/Method of estimation
Transport Services and Storage (66 and 67)	
Gross value added	Combines separate volume measures for Transport Services (66) and Storage (67).
Transport Services (66)	Combines separate measures for Services to Road Transport (661), Services to Water Transport (662), and Services to Air Transport (663).
Services to Road Transport (661)	Output indicator method. Current price car park revenue is revalued separately by the corresponding car park operators' charges, and then combined to form the output indicator.
Services to Water Transport (662)	Combines separate measures for Stevedoring (6621) and Port Operators (6623).
Stevedoring (6621)	Output indicator method. The output indicator is the quantity of different types of cargo handled by stevedores weighted by revenue earned in the reference year.
Port Operators (6623)	Output indicator method. The output indicator is the quantity of cargo loaded and unloaded. The quarterly estimates of cargo are obtained from the same ports noted above for Water Transport.
Services to Air Transport (663)	Output indicator method. The output indicator is revenue. Current price estimates of both revenue and prices are collected from the Civil Aviation Authority.
Storage (67)	No quarterly data are collected for this industry. A reference year estimate of gross value added is extrapolated by a combined measure of estimates for Road Transport (61), Rail Transport (62), Water Transport (63), Air and Space Transport (64) and Services to Transport (66).

24.10 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—COMMUNICATION SERVICES (DIVISION J)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Output indicator method. Output is measured as the combined revenue of the major suppliers of communication services. Revenue and quantity data are obtained directly from the major businesses in the industry. Revenue data are revalued using price data largely from *Consumer Price Index* (Cat. no. 6401.0).

24.11 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—FINANCE AND INSURANCE (DIVISION K)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Sum of estimates for Finance (73) and Insurance (74) as described below.
Finance (73)	
Gross value added	Output indicator method. A quarterly output indicator is obtained by interpolating annual output estimates. The annual output estimates are derived as the sum of FISIM, explicit service charges and gross rent of banks and other financial institutions. The quarterly interpolator is the real assets of banks. The implicit price deflator for domestic final demand is the deflator used to derive the latter.
Insurance (74)	
Gross value added	Output indicator method. A quarterly output indicator is obtained by linear interpolation of annual output estimates. The annual output estimates are derived as the sum of premiums collected and investment income earned by insurance companies.

24.12 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—PROPERTY AND BUSINESS SERVICES (DIVISION L)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Input indicator method using hours worked. These are derived by multiplying average hours worked (published in *Labour Force, Australia* (Cat. no. 6203.0)) by employment data.. Employment estimates are based on the numbers of employees published in *Wage and Salary Earners, Australia* (Cat. no. 6248.0) and the numbers of non-wage and salary earners published in *Labour Force, Australia* (Cat. no. 6203.0).

24.13 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—GOVERNMENT ADMINISTRATION AND DEFENCE (DIVISION M)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Input indicator method using hours worked. These are derived by multiplying average hours worked (published in *Labour Force, Australia* (Cat. no. 6203.0) by employment data.. Estimates of employment are derived as the sum of civilian employment and defence force personnel. The sources of the former are the same as those outlined above for Property and Business Services (Division L). Data for the latter are provided by the Department of Defence.

24.14 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—EDUCATION (DIVISION N)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Input indicator method using hours worked. The sources of these estimates of hours worked are the same as those outlined above for Property and Business Services (Division L).

24.15 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—HEALTH AND COMMUNITY SERVICES (DIVISION O)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Input indicator method using hours worked. The sources of the estimates of hours worked are the same as those outlined above for Property and Business Services (Division L).

24.16 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—CULTURAL AND RECREATIONAL SERVICES (DIVISION P)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Output indicator method. The output indicator comprises the sum of output statistics for the following.
Net expenditure on gambling	Quarterly volume measures are derived from household final consumption expenditure on gambling.
Other entertainment	Quarterly volume measures are derived by combining selected components of household final consumption on entertainment.
Commercial radio and television broadcasting services	Annual output estimates are derived by deflating total revenue from radio and television broadcasting (supplied by the Australian Broadcasting Tribunal) using the implicit price deflator for domestic final demand. Quarterly estimates of output are obtained by linear trend interpolation of the annual estimates.
Cultural and recreational services provided by government	Annual current price estimates are obtained from ABS Public Finance Statistics and revalued by the implicit price deflator for government final consumption expenditure (excluding defence). Quarterly estimates are obtained by linear trend interpolation of the annual estimates.

24.17 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—PERSONAL AND OTHER SERVICES (DIVISION Q)

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Output indicator method. The output indicator is derived by combining various output statistics for the activities described below. They are weighted together using value added data.
Hairdressing and video outlets	Current price estimates of turnover from the monthly retail survey are revalued by components of *Consumer Price Index* (Cat. no. 6401.0).
Funeral services	The estimate of household final consumption expenditure for the reference year is extrapolated using number of deaths as published in *Australian Demographic Statistics* (Cat. no. 3101.0).
Repairs and dry cleaning	Current price estimates of household final consumption expenditure are revalued by components of *Consumer Price Index* (Cat. no. 6401.0).
Law, order and public safety	Annual current price estimates of government final consumption expenditure are revalued by a combined index of wage rates and materials prices taken from *Wage Cost Index* (Cat. no. 6345.0), *Price Indexes of Articles Produced by Manufacturing Industry* (Cat. no. 6412.0) and *Import Price Index* (Cat. no. 6414.0). Quarterly estimates are obtained by linear trend interpolation of the annual estimates.

24.18 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—OWNERSHIP OF DWELLINGS

Industry/Aggregate/Item	Data sources/Method of estimation
Gross value added	Output indicator method. The output indicator is household final consumption expenditure on dwelling rent, including the imputed owner-occupier element.

24.19 QUARTERLY CHAIN VOLUME MEASURES OF GROSS VALUE ADDED BY INDUSTRY—TAXES LESS SUBSIDIES ON PRODUCTS

Industry/Aggregate/Item	Data sources/Method of estimation
Taxes less subsidies on products	A reference year estimate of each of the major taxes and subsidies is extrapolated using a volume indicator of the corresponding activity.

CHAPTER 25 FINANCIAL ACCOUNTS

INTRODUCTION

25.1 This chapter describes the sources and methods used in compilation of the financial accounts and the financial asset/liability components of the balance sheets. The financial accounts record information about transactions in financial assets and liabilities, while the balance sheets provide information about the values of stocks of financial assets and liabilities at particular points in time. Information on the structure of the financial accounts and balance sheets is provided in Chapter 8. Financial accounts statistics are sometimes referred to as 'flow-of-funds' statistics.

25.2 On a quarterly basis, information on transactions in and stocks of financial instruments is provided in *Australian National Accounts: Financial Accounts* (Cat. no. 5232.0). These data are classified by institutional sector/subsector and by type of financial instrument. Annual financial data are provided in *Australian System of National Accounts* (Cat. no. 5204.0). In that publication, financial accounts are provided for each sector as well as for the economy as a whole. Information on stocks of financial assets and liabilities is included as part of the national and sectoral balance sheets. Information on the financial transactions and positions of non-residents vis-a-vis residents is also provided in the ABS publications relating to the balance of payments and the international investment position. In these publications the statistics are presented from the point-of-view of the Australian residents. In the national accounts publications, statistics for the rest of the world sector are presented from the non-residents' perspective.

25.3 In theory, data for compilation of the financial accounts and the financial components of the balance sheets could be obtained from both parties to every financial transaction and position. Under such circumstances, two views would be obtained of each transaction and position (i.e. a creditors' view and a debtors' view). The views should be identical, but may not be in practice. However, costs prevent such an exhaustive approach, and reliance is often placed on reporting by only one of the parties to a financial transaction and/or position. Advantage is taken of the fact that financial transactions of numerous transactors, such as households, are mostly channelled through a much smaller number of other units, such as banks and other financial institutions. Thus, for example, the financial transactions and position of households can be determined by obtaining information from other institutions that engage in financial transactions with households. The information for households so derived is described as 'counterpart' information.

INTRODUCTION *continued*

25.4 The compilation of the financial accounts is mainly based on surveys of financial and other institutions which obtain balance sheet information. This information is used to estimate the value of financial assets and liabilities of the institutions concerned and certain counterparts. 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. In other cases, information on transactions is available from the data sources used to compile the financial account estimates.

25.5 In some cases, information that cannot be obtained directly is derived residually. This is possible because for each financial instrument, other than monetary gold and SDRs, the sum of the net acquisitions of financial instruments for each sector (including the rest of the world) must equal the sum of the net incurrences of liabilities.

CLASSIFICATIONS

25.6 The institutional sector classification used in the financial accounts is the same as that used in the rest of the national accounts. Five broad sectors are identified:

- general government;
- financial corporations;
- non-financial corporations;
- households (including non-profit institutions serving households); and
- rest of the world.

25.7 In Cat. no. 5232.0 the general government, financial corporations and non-financial corporations sectors are broken down into subsectors, as shown in the table below:

25.1 SUBSECTORS SHOWN IN AUSTRALIAN NATIONAL ACCOUNTS: FINANCIAL ACCOUNTS (Cat. no. 5232.0)

NON-FINANCIAL CORPORATIONS SECTOR	FINANCIAL CORPORATIONS SECTOR	GENERAL GOVERNMENT SECTOR
Private non-financial corporations	Central bank	National general government
National public non-financial corporations	Banks	State and local general government
State and local public non-financial corporations	Other depository corporations	
	Life insurance corporations	
	Pension funds	
	Other insurance corporations	
	Central borrowing authorities	
	Financial intermediaries nec.	

25.8 In Cat. no. 5232.0 the institutional sector classification is also used to classify the counterparty transactions and positions shown for each institutional sector/subsector.

CLASSIFICATIONS *continued*

25.9 Chapter 5 provides a description of the sectors and subsectors used in the financial accounts.

25.10 Financial instruments are classified in the national accounts as follows:

- monetary gold and SDRs;
- currency and deposits;
- short-term securities other than shares;
- long-term securities other than shares;
- derivatives;
- loans and placements;
- shares and other equity;
- insurance technical reserves; and
- other accounts payable/receivable

25.11 Chapter 6 provides a description of each of these types of financial instruments. In certain financial account and balance sheet tables, securities are further classified by domicile of issuer (i.e. issued in Australia/issued offshore).

SOURCES OF DATA

25.12 Most of the data used in the compilation of the financial components of the national accounts are derived from statistical surveys conducted by the ABS. Of particular importance are the 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 sources, particularly for estimating for certain types of financial corporations and for deriving valuation adjustments. The specific information sources for each of the sectors and subsectors are described below.

Non-financial corporations

Private non-financial corporations

25.13 Balance sheet data for the largest groups, as well as for those property trusts which are open to the general public, are obtained from the SFI. Estimates for the remainder of units that make up this subsector are derived from data coming from several different sources, including counterpart information from banks, market capitalisation information from the Australian Stock Exchange, and data from the SII.

25.14 Estimates of the value of notes and coin held by this subsector are derived by halving the estimate of notes and coin held outside the banking system, which is in turn derived by subtracting the notes and coins held by the banking system from the total notes and coin in circulation.

National public non-financial corporations

25.15 The largest of these units report balance sheet information in the SFI. Estimates for the remainder of units that make up this subsector are derived from several different sources, including counterpart information from banks and data from the ABS's quarterly SII.

State and local public non-financial corporations

25.16 The largest State corporations provide quarterly balance sheet information to the ABS in the SFI. For State and Territory housing commissions, Annual Reports are used as a data source. For the remaining State and local public non-financial corporations, counterpart information from the central borrowing authorities (which report to the ABS) is used, as the financing for most of these units is arranged through the central borrowing authorities.

Financial corporations

Central bank

25.17 The Reserve Bank of Australia (RBA) provides a full balance sheet to the ABS each quarter. However, some items on the RBA's balance sheet are valued as at the Wednesday closest to the end of the quarter. This is inconsistent with information provided by the Commonwealth Department of Finance and Administration and the commercial banks, both of which close off their accounts on the last working day of the quarter. As the latter timing basis is closer to the conceptual requirements of the financial accounts, counterpart information is substituted for the relevant items. Also, the RBA records entries in the Commonwealth Government's account when cheques are presented for payment, but the Commonwealth Department of Finance and Administration makes these entries in its books when the cheques are drawn, which is likely to be several days earlier. Because of the large amounts involved, this 'float' is a serious problem from time to time, and counterpart information is used to make the necessary adjustments.

Banks

25.18 Each bank provides quarterly, as part of the SFI, a full balance sheet showing the consolidated position of its domestic banking businesses. Data reported by banks in the SII are used to supplement the SFI data.

Other depository corporations

25.19 All cash management trusts report balance sheet data to the ABS monthly. Estimates for building societies and credit unions are derived using data collected by the Australian Prudential and Regulation Authority (APRA). The RBA provides the ABS with information for the remaining depository corporations derived from statutory balance sheet returns. However, these returns do not include information about shareholders' funds. This information is collected quarterly by the ABS from the larger corporations.

Life insurance offices

25.20 The SFI collects balance sheet, transactions and valuation information from the large life insurers. This information is supplemented by data provided by APRA, which requires all privately owned life insurance offices to provide it with assets and liabilities information quarterly. Large friendly societies provide quarterly balance sheet information to the ABS.

Pension funds

25.21 The largest pension funds (both public and private sector) provide quarterly balance sheet, transaction and valuation information in the APRA/ABS Survey of Superannuation Funds. These data are supplemented by an ABS collection from professional fund managers, in which an asset breakdown is reported of the pension funds they manage. This collection is designed to enable the elimination of double counting of pension fund assets. APRA and the ABS jointly estimate the assets of small ('excluded') pension funds.

Other insurance corporations

25.22 All private general insurance companies are required to provide a quarterly statement of assets and liabilities to APRA. The ABS uses this information, which is supplemented by its own quarterly survey of government-owned general insurers. Data for health insurance companies are estimated from annual statistics provided by the Private Health Insurance Administration Council (PHIAC).

Central borrowing authorities

25.23 All central borrowing authorities provide balance sheet data to the ABS on a quarterly basis as part of the SFI.

Financial intermediaries nec.

25.24 Financial Corporations Act Category J financial corporations (credit union leagues and other financial corporations n.e.c.) report quarterly to the RBA, which provides this information in aggregate form to the ABS.

25.25 Balance sheet data for listed and unlisted unit trusts that are open to the general public, and are not cash management, trading or property trusts, are obtained from an ABS quarterly survey of public unit trusts.

25.26 Issuers of asset-backed securities provide quarterly balance sheet data to the ABS as part of the SFI.

25.27 The various government-owned financial institutions included in this sector provide quarterly balance sheet information to the ABS as part of the SFI.

25.28 Security brokers' own-account holdings of financial assets are estimated by investigating residuals in securities statistics.

General government

National general government

25.29 Information on the Commonwealth Government's assets is mostly obtained from counterpart information. Information on the Commonwealth Government's coin liability is provided by the RBA. Information about Treasury notes is provided by the Commonwealth Treasury. Data for Treasury bonds are provided by the Commonwealth Treasury and the RBA. Other liabilities of the Commonwealth Government are estimated using published annual balance sheet data.

25.30 Data for universities are obtained from counterpart information, as most of the funding for these units is provided by government agencies or financial institutions that report to the ABS.

State and local general government

25.31 Quarterly data for the State and Territory Governments are obtained from the relevant Treasuries as part of the SFI. Data for local government is obtained from counterpart information, as most of the funding for these units is provided by government agencies that report to the ABS.

Households (including unincorporated enterprises)

25.32 Estimates of the value of notes and coin held by this sector are derived by halving the estimate of notes and coin held outside the banking system, which is in turn derived by subtracting the notes and coins held by the banking system from the total notes and coin in circulation. Other estimates for this sector are generally obtained from counterpart information. Estimates for transactions and holdings of securities are derived residually.

Rest of the world

25.33 The main source of data on the financial position of non-residents vis-a-vis residents is the SII, which measures the investment position, financial transactions and other changes in position (price changes, exchange rate changes and other adjustments), and investment income associated with claims on and liabilities to non-residents by Australian residents. The publication *Balance of Payments and International Investment Position, Australia, Concepts Sources and Methods* (Cat. no. 5331.0) provides further information on this survey.

COMPILATION METHODS

25.34 Estimates of stocks (levels) are prepared by gathering together balance sheet information from various sources and selecting the most reliable estimates. As noted previously, a choice is often possible because different data sources provide alternative or counterpart measures of the same item. For example, most borrowing by State-owned non-financial corporations will be reported by the State central borrowing authorities or Treasuries as assets and by the non-financial corporations themselves as liabilities. The data will generally not agree because the ABS does not survey all State owned non-financial corporations. In this case, the data from the central borrowing authorities and Treasuries are therefore used to estimate both the asset and liability aspects of these borrowings.

25.35 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 revalued 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 actually reported opening and closing stocks to obtain an estimate of the valuation effect.

COMPILATION METHODS
continued

25.36 In other cases, transactions are estimated using directly collected data rather than by differencing levels. Most of the estimates of transactions involving non-residents are based on directly collected data from the SII. Likewise, transactions data are directly collected for life insurance offices and pension funds.

25.37 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.

Accounting issues

25.38 The national accounts should record transactions on an accrual basis (as opposed to a cash or 'due for payment' basis), to reflect the time when economic value is transferred rather than when cash relating to the transaction is paid or falls due for payment. For practical reasons complete implementation of accrual accounting in the financial accounts is not possible. Two affected areas are:

- *accrual of income tax*—refunds and additional payments as a result of ATO assessments are recorded in the periods in which amounts are due to be paid, and not in the periods in which the income underlying the assessments was actually earned; and
- *accrual of certain employee entitlements, including recreation and long service leave*—these entitlements are recorded when they are actually paid, and not when they are accrued.

25.39 Accordingly, assets and liabilities associated with income tax and employee entitlements are not recorded in the financial accounts.

25.40 Furthermore, non-financial corporations are likely to report balance sheet information on a complete accrual basis for the quarter that coincides with the end of their tax year (usually June), but may be less likely to do so for the other quarters. This may cause some distortion in the data for the two quarters surrounding the end of the tax year.

25.41 Stocks of financial assets and liabilities should be 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.

25.42 Tradable securities, which include shares listed on the Australian Stock Exchange (ASX) and debt securities traded on organised markets, are valued at actual market prices. Other securities are assigned estimated market values. For example, equity not listed on ASX is valued on the basis of the value of total assets of the enterprise in question less the value of any repayable liabilities.

Accounting issues *continued*

25.43 For derivatives, respondents to ABS surveys are asked to mark each derivative contract to its net market value. This may result in a net asset or liability value being recorded for the contract. It is possible for a derivative contract to change from a net liability position to a net asset position (or vice versa) from one period to the next.

25.44 Deposits, loans and other accounts payable/receivable are recorded at their face value. As these instruments are not traded, this valuation basis is considered to be an acceptable proxy for market valuation.

25.45 Insurance technical reserves funds are valued on the basis of the market value of the total assets (including non-financial assets) of the funds and companies less the sum of any repayable liabilities and (in the case of companies) shareholders' funds.

QUALITY

25.46 The ABS is aware of the following deficiencies in its financial accounts data:

- balance sheet information is not collected 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. Estimates are made for these unreported assets using the partial information reported by fund managers;
- there are some classification and timing problems in the data being reported by some large banks;
- the quality of the data for the other depository corporations subsector is only fair;
- the quality of data for the rest of the world sector is affected by deficiencies in coverage, classification and valuation;
- stock lending, repurchase agreements, and short selling in securities markets—and inconsistent treatment of these practices by respondents—are causing some double counting of asset records for some types of securities;
- derivative and synthetic financial products are generally not reported in non-ABS data sources;
- the estimates of the stock of issued shares of unlisted private non-financial corporations are very poor; and
- the estimates of other accounts payable/receivable for small corporations and the households sector are very poor.

QUALITY *continued*

25.47 The dissection of changes in balance sheet positions into transaction and non-transaction components is most important for tradable securities, as these instruments are most likely to be affected by valuation changes. The data used to estimate the effect of valuation changes on frequently traded securities, which include listed shares and Commonwealth and State government bonds/bills, are of good quality. The data available for securities that are less frequently traded, such as unlisted shares, are of only fair quality.

25.48 Despite the above-mentioned problems, the ABS considers that the financial accounts statistics are of an acceptable standard for the purposes they are intended to serve. An indication of the overall quality of the data can be gained by considering the households sector, which is judged to have the poorest quality data in the financial accounts. Most of the liabilities data are based on good quality counterpart data from the asset records of financial institutions. In addition, households' deposit and loan assets are based on good quality counterpart data. Household holdings of tradable securities are derived residually, and so reflect errors and omissions in the estimates for the other sectors. Household positions in other accounts payable/receivable are also derived residually.

COMPARISON WITH PREVIOUS RBA ESTIMATES

25.49 The ABS's financial accounts estimates were first compiled in respect of the September quarter 1989. Prior to then, the RBA had produced annual flow-of-funds statistics for the reference years 1953–54 to 1988–89. The two sets of statistics, however, are not directly comparable for the following reasons:

- the ABS statistics are compiled mainly from specially conducted statistical surveys, whereas the RBA's series were compiled mainly from administrative sources. These administrative by-product data were different in scope, coverage, timing and classification from the survey data used by ABS;
- the ABS statistics use the same institutional sectors as in other parts of the national accounts, whereas the RBA's sectoring was different. The RBA combined Commonwealth public non-financial corporations with Commonwealth general government, and State and local public non-financial corporations with State and local general government. Also, the RBA's statistics had a more detailed classification of financial corporations than that presented in the ABS's financial accounts; and
- the ABS statistics use a more extensive classification of financial instruments than that used by the RBA, although the RBA's classification can be constructed from the ABS statistics.

CHAPTER 26 BALANCE SHEETS

INTRODUCTION

26.1 A balance sheet is defined in paragraph 13.1 of SNA93 as follows:

> "A balance sheet is a statement, drawn up at a particular point in time, of the values of assets owned and of the financial claims—liabilities—against the owner of those assets. A balance sheet may be drawn up for institutional units, institutional sectors and the total economy."

26.2 This chapter contains 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 (including share capital).

CLASSIFICATION OF ASSETS IN THE BALANCE SHEET

26.3 Under SNA93 guidelines, 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.

26.4 SNA93 describes three types of asset that should be included in the national balance sheets:

- non-financial produced assets;
- non-financial non-produced assets; and
- financial assets (and liabilities).

DIFFERENCES BETWEEN SNA93 AND ASNA IN THE ASSET BOUNDARY

26.5 The balance sheet estimates are generally consistent with SNA93 recommendations, although there are three main areas where the ABS has not followed the recommendations of SNA93 with regard to the asset boundary.

26.6 The first of these divergences relates to the types of subsoil assets valued in the balance sheet. Paragraph 13.59 of SNA93 states:

> "Subsoil assets are proven reserves of mineral deposits located on or below the earth's surface that are economically exploitable given current technology and relative prices."

26.7 The ABS has taken the view that proven resources are too restrictive a concept to guide economic decision making in the Australian context. The volume of subsoil assets available for production is more accurately reflected by the term 'economically demonstrated resources' (EDR), which equate 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. Furthermore, EDR estimates are the only data available in Australia on quantities of exploitable subsoil assets.

DIFFERENCES BETWEEN SNA93 AND ASNA IN THE ASSET BOUNDARY *continued*

26.8 Second, while the flow accounts record new expenditure on mineral exploration (as gross fixed capital formation), the Australian balance sheets do not record a 'stock' value for mineral exploration. To the extent that SNA93 recommends the inclusion of mineral exploration in a nation's balance sheet, the ASNA is currently inconsistent with these recommendations. However, following representations from the ABS and other national statistical agencies, the SNA93 recommendation is being reviewed. The ABS view is that the total value of mineral exploration is already captured in the value of the stock of subsoil assets (in most instances subsoil assets appear as a result of exploration activity).

26.9 A third difference in treatment between the Australian national balance sheets and SNA93 is the treatment of ownership transfer costs. SNA93 suggests that these expenditures are an integral part of the value of the asset, and therefore that they should be included in the value of the asset being acquired. While the ABS recognises new expenditures on ownership transfer costs as gross fixed capital formation, the current treatment is that these expenditures are expensed within the year of acquisition, and so no stock value is recorded in the balance sheets. This decision is currently under review by the ABS.

26.10 Further, while SNA93 recommends that some assets such as valuables, water resources and intangible non-produced assets be included in national balance sheets, they are not recorded in the ASNA. However, in principle the ABS agrees that these assets should be included, though at present there are insufficient data to do so.

GENERAL PRINCIPLES OF VALUATION

26.11 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 absence of observable market prices, current prices can be approximated for balance sheet purposes in two ways. 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). 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.

THE ABS APPROACH TO VALUATION

Non-financial produced and financial assets

26.12 The principles of valuing non-financial produced and financial assets in the ASNA are covered in Chapters 16, 17, and 25 respectively. These are mostly consistent with the approaches recommended in SNA93.

Non-produced assets

Subsoil assets valuation

26.13 As there are insufficient transactions in subsoil assets in Australia to determine a reasonable price, the ABS has used the net present value (NPV) approach; given the data constraints, this is considered to provide more reliable estimates than alternative approaches.

26.14 The NPV approach involves calculating the expected future net income flow generated by the asset, and then discounting at an interest rate for the life of the asset. This initially involves estimating the value of gross output (price multiplied by production) during a twelve month period and deducting costs (including a normal return on produced capital) to derive net income. This difference is taken to be the equivalent of economic rent. The future income flow has been calculated for each year before being discounted over the expected mine life to obtain a value in today's dollars.

26.15 Normal returns to produced capital need to be excluded, as economic rent represents the returns from the resource only (and not any returns on produced capital used to extract the resource). 'Normal' returns on capital should include a reward to cover the cost of riskless capital, premium to cover risk and uncertainty in exploration and development, and an overall long term risk premium to cover price volatility and inflation. Data on normal returns to produced capital are derived by the ABS using a combination of data from a mineral economics consultancy firm and ABS capital stock estimates. While returns on produced assets are similar for most mining commodities, returns on lead and black and brown coal are somewhat lower than the industry average, while returns on petroleum commodities are, on average, higher. The difference in commodity returns reflect lower (or higher) risks and uncertainty in exploration and development.

26.16 In the derivation of real (inflation adjusted) discount rates, the ABS 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.

Timber valuation

26.17 As with subsoil assets, market transactions for forests are not common. For Plantations there are readily available proxies for market values, namely insurance values.

26.18 Standing timber is valued differently for native forests than plantation forests because there is no suitable market price data available, proxies or otherwise.Accordingly, the ABS has adopted as an alternative the NPV of the future stream of royalty income (on the assumption that royalties approximate economic rent).

Timber valuation continued

26.19 The estimates of the value of Australia's timber resources are based on the estimated net area of forest available for production in each State and Territory.

Native standing timber

26.20 In line with the recommendations of SNA93, the ABS has valued native forests using the NPV method.

26.21 The ABS has valued native standing timber using a net value-of-production approach over the estimated rotation cycle of the forests. The ABS chose the cost of borrowing to the forest industry to represent the forest industry's nominal discount rate. The ABS estimated the cost of borrowing by deriving a five-year lagged moving average of the Reserve Bank's average indicator rate for large business loans. To derive a real rate of discount, the ABS has constructed an index reflecting changes in prices of forest industry inputs.

Coniferous plantations

26.22 Coniferous forests were 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) as determined by the Australian Forest Growers' Association.

Broadleaved plantations

26.23 These were also valued using insurance schedules showing the insured value of each hectare of forest according to tree age (up to 20 years). These schedules are determined by the Australian Forest Growers' Association.

Out of scope timber values

26.24 Standing timber other than that recommended for inclusion in national balance sheets in SNA93 may also have an economic value. 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.

26.25 Although these forests contain commercially viable timber, logging is prohibited. As long as this situation continues, the ABS will not include this potential timber value in its balance sheet estimates.

26.26 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 ABS balance sheet estimates.

COMPONENTS OF THE BALANCE SHEET FOR AUSTRALIA

Produced assets other than livestock and plantations

26.27 Estimates of produced fixed assets shown in the balance sheet, other than livestock, are essentially derived using the perpetual inventory method. For a description of this method see Chapter 16.

26.28 Estimates of private non-farm inventories are derived from information reported in *Inventories and Sales, Selected Industries* (Cat. no. 5629.0). Estimates of other inventories, other than livestock and plantation forests, are generally derived using the perpetual inventory method. Inventories are further discussed in Chapter 17.

Financial assets and liabilities

26.29 Data for financial assets are obtained from *Australian National Accounts: Financial Accounts* (Cat. no. 5232.0) and unpublished estimates. Chapter 25 provides information on the sources and methods used to compile these estimates. Estimates of financial assets and liabilities for 30 June 1995 and later dates are not fully consistent with the estimates shown for earlier dates. The break in series is due to major changes to the data from 30 June 1995 associated with the implementation of SNA93. As a result of this break in the series, net worth and total assets and liabilities are also not consistent across these two periods.

Livestock

26.30 All livestock under the economic management of institutional units within Australia are in scope of the balance sheet estimates.

26.31 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 entertainment, sheep for wool and dairy cattle) are considered to be fixed assets. Inventories cover all other livestock types and include those animals raised for meat or other one-off products (e.g. leather).

26.32 A wide range of data sources has been used. A primary data source has been the annual Agricultural Census conducted by the ABS, which provides the livestock numbers. As the census estimates are as at 31 March, data on livestock slaughterings (from *Livestock Products, Australia* (Cat. no. 7215.0) and exports data have been used to estimate the numbers as at 30 June. For some livestock types it has been necessary to use industry sources and publications to obtain the required quantity data.

26.33 Data on the prices of animals have generally been obtained from industry publications and sources.

Land

26.34 Land is defined in the SNA93 as

> "the ground itself, including the soil covering; (and any) associated surface water" (SNA93, paragraph 10.121).

Excluded are any buildings or other produced structures situated on it (cultivated crops, trees and livestock); subsoil assets; non-cultivated biological resources and water resources.

26.35 Estimates for the value of land in the balance sheets include freehold and leasehold land in private hands, plus land owned by Commonwealth government business enterprises, but exclude land held by the Commonwealth Government and State and local governments and their business enterprises.

26.36 From 30 June 1992 to 30 June 1999, estimates of land values were supplied to the ABS from each of the State and Territory Valuers-General. The 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.

Subsoil assets

26.37 Subsoil assets are defined in SNA93 to consist of

> "proven resources of mineral deposits located on or below the earth's surface that are economically exploitable given current technology and relative prices" (SNA93, paragraph 13.59).

Subsoil assets consist of known deposits of coal, oil and natural gas, metallic minerals and non-metallic minerals.

26.38 Estimates of mineral resources in Australia are published annually by the Australian Geological Survey Organisation in *Australia's Identified Mineral Resources*. Production costs are provided by a private consulting firm and are derived using a number of models and regression techniques incorporating both known and estimated variables.

Standing timber

26.39 Standing timber assets cover both plantation and native forests. SNA93 does not specifically identify the types of standing timber to be included in 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.

Standing timber *continued*

26.40 Data on timber production from native forests (in value or volume terms), and average rotation cycles, have been obtained from the Australian Bureau of Agricultural and Resource Economics (ABARE) and each of the State forestry departments. Data on plantation forest area and plantings have come from the Bureau of Resource Sciences from 1995. From 1975 to 1995, these data were supplied by ABARE. Prior to 1975, annual planting data were not available, and so annual plantings had to be estimated based on annual increases in total plantation area in each year up to 1975.

THE OTHER CHANGES IN VOLUME OF ASSETS ACCOUNT AND THE REVALUATION ACCOUNT

26.41 Discoveries and depletion of subsoil assets are recorded in the other changes in volume of assets account, while any holding gains and losses are included in the revaluation account. Further, growth and harvesting of native timber are recorded in the other changes in volume of assets account, while any holding gains are included in the revaluation account.

SECTORAL ESTIMATES

26.42 A sectoral breakdown of the national balance sheet is also provided. The Australian national accounts identify four domestic institutional sectors within the economy (the household sector (which includes unincorporated enterprises and NIPSHs), general government, financial corporations and non-financial corporations). Transactor units are assigned to a sector according to their functional role in the economy.

26.43 The sectoral split is based on a variety of sources including published and unpublished ABS 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 were derived using fixed ratios or related data as an indicator of sector ownership.

RELIABILITY OF THE ESTIMATES OF NATURAL RESOURCES

26.44 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 is still very much in its infancy, and the values should be interpreted with caution and used in conjunction with the physical stocks of the resources.

26.45 SNA93 acknowledges that valuation of expected net returns, resulting from the commercial exploitation of these natural resources, is subject to great uncertainty and liable to 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 (SNA93, paragraph 13.60). As such data are not available in Australia, it is necessary for the ABS to calculate the net present value of these resources.

RELIABILITY OF THE ESTIMATES OF NATURAL RESOURCES *continued*

26.46 Given the way that the experimental estimates of subsoil 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.

26.47 The volatility of the monetary estimates means that they should be looked at in conjunction with the physical stocks of the resources. 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.

26.48 While the natural resource estimates are still experimental, the ABS has consulted with a range of industry participants and related departments in an attempt to improve its estimates. The ABS is also involved in international conferences and discussion groups which have been convened with the objective of developing the most appropriate approach.

USES OF THE BALANCE SHEET

26.49 The monetary estimates of natural resources contained in the balance sheet are underpinned by a data set 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.

26.50 The estimates provide information for monitoring the availability and exploitation of these resources and for assisting in the formulation of environmental policies. Data on the level and composition of tangible and financial assets and liabilities also indicate the economic resources and claims on a nation and each sector, and are input to assessments of the nation's external debtor or creditor position.

26.51 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. In a period of concern about the level of saving in Australia, national and sector balance sheets provide additional information on the relationship between consumption and saving behaviour.

CHAPTER 27 PRODUCTIVITY MEASURES

INTRODUCTION

27.1 The ABS produces annual indexes of labour, capital and multifactor productivity for the market sector, and annual labour productivity indexes (gross value added per hour worked) for each industry division within the market sector. The ABS also publishes quarterly estimates of GDP per hour worked for the market sector and for the whole economy, and quarterly and annual GDP per capita. Annual productivity measures are published in *Australian System of National Accounts* (Cat. no. 5204.0), and quarterly indexes of GDP per hour worked are published in *Australian National Accounts: National Income, Expenditure and Product* (Cat. no. 5206.0).

27.2 There are a number of alternative approaches to measuring productivity, including the use of different production functions, some of which are described in detail in the ABS Occasional Paper: *Estimates of Multifactor Productivity* (Cat. no. 5233.0). The approach adopted by the ABS has been founded on neo-classical economic theory. It is based on a translog production function in conjunction with two assumptions: (i) there are zero economies of scale; and (ii) the marginal products of capital and labour are equal to their respective real market prices.

27.3 ABS productivity statistics provide a measure of changes in the efficiency of production:

- For *multifactor productivity* (MFP), the changes are measured as the growth in the ratio of real value added to the combination of two factor inputs, capital and labour. MFP represents that part of the change in production that cannot be explained by changes in the measured inputs. The term 'multifactor productivity' is used in preference to 'total factor productivity', as not all changes in all inputs are taken into account.
- *Single factor measures of productivity* provide a measure of real gross value added to one of the factor inputs: labour or capital.

CONCEPTS

Labour productivity

27.4 Measures of real output per unit of labour are conventionally referred to as measures of labour productivity. Quite clearly, changes in this ratio can reflect technological changes and changes in other factor inputs (such as capital) as well as labour efficiency. Also, contributions of the various factors to the overall change are not necessarily always positive. In short, these types of estimates are no more than the outcome of dividing a measure of output by a measure of labour input.

27.5 The measure of real output used by the ABS in its estimates of productivity is gross value added in chain volume terms. This is defined to be output less intermediate inputs (materials, energy, business services, etc. used up in the process of production), derived as a chain volume index. The measure of input used is hours worked.

Capital productivity

27.6 Measures of real output per unit of capital are conventionally referred to as measures of capital productivity. Changes in this ratio can also reflect technological changes and changes in other factor inputs (such as labour), as well as capital efficiency.

27.7 The measure of input used by the ABS in its estimates of capital productivity is the flow of capital services. They are calculated by weighting chain volume measures of the productive capital stock of different asset types together using their rental prices as weights. Rental prices can be regarded as the 'wages' of capital.

Multifactor productivity

27.8 The most obvious limitation of labour and capital productivity measures is that they attribute to one factor of production—labour or capital—changes in efficiency attributable to all factors of production. However, in practice it is not possible to attribute the changes in output directly to specific factor inputs. This limitation has given rise to the development of a more comprehensive measure, multifactor productivity. MFP takes account of several factor inputs at the same time, and is largely a measure of the effects of technical progress, improvements in the work force, improvements in management practices, economies of scale, and so on. MFP can also be affected in the short term to medium term by other factors such as the weather, and by variations in capacity utilisation associated with the business cycle.

27.9 MFP growth occurs when there is an upward shift in the production function. For example, suppose in year 1 a production function is defined that equates any combination of all the available factor inputs to the amount of output that could be produced using them. As time elapses, new and more efficient technologies are introduced that produce a greater level of output than the old technologies did for the same combination of factor inputs. Because the production function is defined in terms of old technologies, the actual level of output in year 2 is greater than the level of output the production function predicts. As conventionally measured, this gap is indicative of the productivity growth.

27.10 The ABS derives its estimates of MFP for the market sector by forming a combined chain volume measure of labour and capital inputs and dividing it into the chain volume measure of the gross value added of the market sector. The elemental capital inputs are compiled at a detailed level. There are capital input measures for up to 14 asset types for the corporate and unincorporated sectors for each of the 12 industry (ANZSIC) divisions that comprise the market sector. For each capital input there is a volume indicator of the flow of capital services and a rental value that is used to weight the service flow with the service flows of other capital inputs. An aggregate chain volume measure of capital services for the whole market sector is then weighted with a measure of hours worked using estimates of capital and labour income as weights.

The market sector

27.11 MFP measures are calculated for the 'market sector', a special industry grouping comprising the following industries: Agriculture, forestry, and fishing; Mining; Manufacturing; Electricity, gas and water; Construction; Wholesale trade; Retail trade; Accommodation, cafes and restaurants; Transport and storage; Communication services; Finance and insurance; and Cultural and recreational services. This industry grouping relates broadly to marketed activities for which there are satisfactory estimates of the growth in the volume of output.

27.12 The industries excluded from the market sector and included in the 'non-market sector' are: Property and business services; Government administration and defence; Education; Health and community services; Personal and other services; and the special industry Ownership of dwellings. MFP measures are not presented for these industries because the volume estimates of gross value added are derived using a method in which input data are used as measures of output. As a result, meaningful productivity measures cannot be derived for these industries at present because the measure of real gross value added effectively assumes that there has been no change in productivity.

27.13 All but two of the industries in the non-market sector are dominated by the general government sector. 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, e.g. 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. The Property and business services industry has also been included in the non-market sector because the chain volume estimates of gross value added have been derived using input data. Ownership of dwellings is excluded from the market sector because no employment is associated with it.

27.14 Labour productivity however, is published annually for the total of all industries (including the non-market sector) as an index of gross value added per hour worked, and for market industries individually. In addition, quarterly measures of GDP per hour worked are produced for the market sector and for the total of all industries.

27.15 The market sector includes all institutional sectors, including general government. 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.

GDP per capita

27.16 The ABS publishes annual and quarterly estimates of GDP per capita, calculated as the ratio of real (i.e. in chain volume terms) GDP to the estimated resident population. Population estimates for each State are obtained from *Australian Demographic Statistics* (Cat. no. 3101.0) and projected to the latest quarter based on current trends, and then summed to obtain the Australia total.

Measurement of capital input

27.17 As explained in Chapter 16, the capital services produced by an asset over its life are directly proportional to the productive capital value of the asset. By weighting together volume indexes of the productive capital stock of different assets using their rental prices as weights, an aggregate index of capital services can be produced.

27.18 Estimates of productive capital stock for the following asset types have been used in the ABS estimation of MFP:

- six types of 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;
- buildings and structures other than dwellings;
- livestock;
- artistic originals;
- mineral exploration;
- computer software;
- inventories; and
- land.

27.19 Chapter 16 provides a full description of the method used to derive the capital stock measures for the relevant components of gross fixed capital formation (i.e. all assets listed above except inventories and land). The method used to derive productive capital stock using age-efficiency profiles is also described. Volume estimates for the inventory items are obtained for all the market sector industries other than Communications, Finance and insurance; and Cultural and recreational services. Chapter 17 discusses inventories in detail.

27.20 A benchmark estimate of agricultural land is obtained from the balance sheet, where the value for the reference period is chosen. The stock of agricultural land is treated as a non-depreciable asset—in volume terms it remains constant over time.

Measurement of capital input *continued*

27.21 For non-agricultural land, estimates for each industry are calculated by taking the balance sheet value for the reference year as a benchmark, and assuming that the growth rate is half that of the productive capital stock of non-dwelling construction. This approach recognises that changes in the capital services provided by land can accrue due to changes in the value of the building on it, but disproportionately so.

27.22 An index of capital services is compiled in the form of a Tornqvist index (i.e. the weighted geometric mean of the component growth rates). The growth rates of productive capital stocks of each asset type are weighted together using estimates of the rental prices. Rental prices are generally unobservable because, for most capital, the owner is also the user, and so they are imputed as being equal to the 'user cost of capital', described in paragraphs 27.55 to 27.60.

27.23 Of all the constituents of the MFP measures, capital input poses the most problems. A major weakness of the estimates of capital services stems from the uncertain quality of the data used in their construction, such as mean asset lives and asset life distributions. These limitations are discussed in detail in Chapter 16.

Measurement of labour input

27.24 Indexes of hours worked are used to estimate labour input. The hours worked estimates are derived as the product of employment and average hours worked. Using an index of hours worked provides a better measure of labour input than using employment, because hours worked captures changes in overtime worked, standard weekly hours, leave taken, and changes in the proportion of part-time employees. However, changes in the skill level of the labour force are not captured in hours worked, and so are reflected in the productivity estimates. To obtain a measure of productivity that excluded the effect of changing skill levels, it would be necessary to adjust hours worked for changes in the quality of the labour force.

27.25 The hours worked series are presented only in index number form because of limitations in the hours worked data (discussed in more detail in paragraphs 27.31 and 27.32 below).

Employment estimates

27.26 The employment estimates used to derive hours worked comprise all labour engaged in the production of goods and services, and include not only civilian wage and salary earners but also:

- employers;
- self-employed persons;
- persons working one hour or more without pay in a family business or on a farm; and
- members of the Australian defence forces.

The annual figures are simple averages based on the available observations of employment levels during the year.

Employment estimates continued

27.27 Estimates of employment are compiled for individual industries from the September quarter 1984 for quarterly data and 1984–85 for annual data. Estimates for the total (all industries) and the market sector are compiled from the September quarter 1978 for quarterly data, but from 1964–65 for annual data. In compiling employment estimates several sources have been used, as described below.

All industries

27.28 Total employment has been compiled from the following sources:

- civilian employment—*The Labour Force, Australia* (Cat. no. 6203.0); and
- enlisted service personnel—Department of Defence.

Monthly labour force survey data are averaged to form quarterly and annual estimates.

Individual industries

27.29 Industry estimates have been compiled with the objective of ensuring consistency between estimates of industry employment and gross value added (ideally both sets of estimates should be derived from the same source for each industry). This has been possible only in respect of the Manufacturing industry. For other industries, classification changes and discontinuities in the available series have made this impracticable. Consequently, the industry employment estimates are subject to a number of limitations. These and other aspects concerning the reliability of the employment estimates used in calculating estimates of labour productivity are discussed under 'Reliability of employment estimates' below. Data sources for specific industries are as follows:

- *Manufacturing* (for all years except 1985–86): employment estimates have been obtained from the annual survey/census of manufacturing establishments, the only instance in which it is possible to use one collection as the source for both chain volume estimates of gross value added and employment. For 1985–86, when survey/census data were unavailable, employment has been estimated from the same data sources as for other industries (see below).
- *Other industries*: the employment estimates have been compiled from:
  - *The Labour Force, Australia* (Cat. no. 6203.0); and
  - enlisted service personnel—Department of Defence.

The labour force survey estimates relate to the mid-month of the quarter, there being no industry estimates for the first and last month of each quarter.

- *Market sector estimates*: the market sector employment estimates are obtained by deducting estimates of non-market sector employment from the 'All industries' estimates. Non-market sector employment comprises defence force employment (referred to above) and civilian sector employment for the following industries: Property and business services; Government administration; Education; Health and community services; and Personal and other services.

Employment estimates continued

27.30 Further adjustments are made to the employment estimates for the Construction industry. From 1980–81, labour force survey estimates for the Construction industry exclude some employment previously included. From that year construction-related employment of enterprises primarily engaged in Transport and storage or Communication services is classified to the Transport and storage or Communication services industries as appropriate. For consistency between industry gross value added and employment estimates, and for consistency over time, the relevant employment estimates have been adjusted to include construction-related employment in the Construction industry for the whole period.

Average hours worked

27.31 Estimates for average hours worked are available each month in total. However, they are available only for the mid-month of each quarter for individual industries and the market sector. As the average hours worked series relate to a particular fortnight in the first half of the month they have several limitations, as outlined below. Corrections can be made for only some of these limitations.

- Because of the occurrence of holidays within each quarter, hours worked reported in the reference period may not be representative of the quarter. For example, the average hours worked recorded in February may overstate the average level for the quarter as they do not reflect the large number of employed persons going on leave in January. This is the main reason for presenting the hours worked estimates in index form.
- Hours worked in the reference period may reflect the changing incidence of public holidays (associated with New Year's Day, Australia Day, Easter and some State holidays). To overcome this limitation a calendar correction is made. Nevertheless, it has been found that even after calendar correction the estimates for some 'shoulder' months are still quite volatile. For this reason only the estimates of average hours worked in the mid-month of each quarter are used to derive the estimates of hours worked for 'all industries'.
- Labour force survey estimates exclude members of the Australian defence forces, and so details of their hours worked are not available from this source. These employees are assumed to work the same average hours per week as civilian employees.

27.32 A significant potential problem with hours worked would arise if there were a substantial bias in the estimates (due to a tendency of respondents to either overestimate or underestimate the hours worked in the reference week), but this would only affect the growth rate if the bias were to change through time. If respondents do have a tendency to report biased hours worked, it seems reasonable to assume that they would continue to do so to approximately the same extent. Nevertheless, it provides further justification for presenting the hours worked estimates in index form.

27.33 Changes in labour inputs due to such factors as changes in the level of educational attainment or the age distribution of the work force are more difficult to quantify. At present, the ABS does not attempt to make such adjustments.

The capital-labour (KL) multifactor productivity model

27.34 ABS estimates of MFP have been derived for the market sector using the conventional capital-labour model. In this approach, a production function is postulated as follows:

$$V_t = A_t \int [K_t, L_t] \qquad (1)$$

where V_t = real output
K_t = real capital input
L_t = real labour input
A_t = an index of MFP, reflecting technological change, etc.

$\int [K_t, L_t]$ = a function of factor inputs K_t,L_t, that defines the expected level of output at time t, given the conditions and technology in the base period

t = a continuous measure of time.

27.35 It can be shown (see Appendix I of the Occasional Paper: *Estimates of Multifactor Productivity, Australia* (Cat. no. 5233.0)) that

$$\frac{\dot{V}}{V} = \frac{\dot{A}}{A} + S_k \frac{\dot{K}}{K} + S_l \frac{\dot{L}}{L} \qquad (2)$$

where $\dot{V}$, $\dot{A}$, $\dot{K}$ and $\dot{L}$ are derivatives with respect to time:

$\dot{V} = \frac{\partial V}{\partial t}$, etc.

and $S_k = \frac{\partial V}{\partial K}\frac{K}{V}$ and $S_l = \frac{\partial V}{\partial L}\frac{L}{V}$

27.36 The weights S_k and S_l are the output elasticities of the two factor inputs.

27.37 S_k and S_l are unobservable and two assumptions are made in order to produce a workable model. The first assumption of constant returns to scale ensures the S_k and S_l sum to unity. The second assumption is that the marginal products of capital and labour are equal to their respective real market prices. The two assumptions imply:

$$S_k = \frac{KP_k}{KP_k + LP_l} \text{ and } S_l = \frac{LP_l}{KP_k + LP_l}$$

where P_k = the rental price of capital services, and
P_l = the price of labour.

27.38 The weights, S_k and S_l, are the relative cost shares of capital and labour in the total cost.

The capital-labour (KL) multifactor productivity model *continued*

27.39 Equation (2) can be expressed alternatively as:

$$\frac{\dot{A}}{A} = \frac{\left(\frac{\dot{V}}{I}\right)}{\frac{V}{I}} \text{ where } \frac{\dot{I}}{I} = S_k \frac{\dot{K}}{K} + S_l \frac{\dot{L}}{L}$$

which states that the growth rate of multifactor productivity is equal to the growth rate of the ratio of output to input. This implies that productivity can be expressed as the ratio of output to a composite index of inputs, i.e.

$$A_t = \frac{V_t}{I_t} \qquad (3)$$

27.40 The index, I_t, is computed as a Tornqvist index—the discrete equivalent of a Divisia index. It is calculated recursively from the geometric mean of the growth rates of the two inputs:

$$\frac{I_t}{I_{t-1}} = \left(\frac{K_t}{K_{t-1}}\right)^{W_{kt}} \cdot \left(\frac{L_t}{L_{t-1}}\right)^{W_{lt}}$$

Where W_{kt} and W_{lt} are the respective average relative cost shares of capital and labour in periods t and t-1, and are given by:

$$W_{kt} = \frac{S_{kt} + S_{k(t-1)}}{2} \text{ and } W_{lt} = \frac{S_{lt} + S_{l(t-1)}}{2}$$

27.41 The chain volume measure of gross value added at market prices is used to measure real output, V. The measure of labour input is hours worked, described above, and the measure of capital input is capital services described below.

Capital and labour income shares

27.42 For the market sector, in which general government GOS for market sector industries is included and the GOS of dwellings owned by persons is excluded:

- Total income = GOS of corporations and general government + Gross mixed income + Compensation of employees + Taxes less subsidies on production and imports.
- Gross mixed income and Taxes less subsidies on production and imports include both capital and labour components, and these are split in order to obtain capital and labour shares—see paragraphs 27.43 and 27.44 below for details. Thus:
- Total income = GOS + Proprietors' capital income + Net taxes on production (capital) + Compensation of employees + Proprietors' labour income + Net taxes on production (labour).

Capital and labour income shares *continued*

27.43 Capital's income share is given by:

$$S_k = \frac{\text{GOS + proprietors' capital income + Net taxes on production (capital)}}{\text{Total income}}$$

27.44 Labour's income share is given by:

$$S_l = \frac{\text{Compensation of employees + Proprietors' labour income + Net taxes on production (labour)}}{\text{Total income}}$$

27.45 The respective average relative cost shares of capital and labour, W_{kt} and W_{lt}, are used in the translog index of MFP.

Splitting gross mixed income

27.46 For the household sector, the labour and capital shares of income earned by unincorporated enterprises are subsumed into one national accounts aggregate: gross mixed income. The following procedure has been used to impute the labour and capital shares of this aggregate for each industry in the market sector.

27.47 An initial estimate of labour income is imputed by assigning to proprietors and unpaid helpers the same average compensation per hour received by wage and salary earners. An initial estimate of proprietors' capital income is derived by multiplying the household productive capital stocks for each industry and asset type by corporate rental prices. An implicit value of proprietors' gross mixed income is obtained by summing the two products:

$$\hat{Y}_{ui} = \left(e_{ci} . H_{ui}\right) + \sum_j \left(r_{cij} . K_{uij}\right)$$

Where $\hat{Y}_{ui}$ = the implicit value of proprietors' gross mixed income in industry *i*

e_{ci} = the corporate average hourly compensation rate for wage and salary earners, industry *i*

H_{ui} = total proprietors' hours worked

r_{cij} = the corporate rental price rate for industry *i*, asset type *j*

K_{uij} = household sectors' productive capital stock for industry *i*, asset type *j*

27.48 Final estimates are obtained by multiplying the average compensation per hour and the rental price component of $\hat{Y}$ by a scaling factor. This factor equates the sum of proprietors' capital and labour incomes to actual gross mixed income:

$$Y_{ui} = \left(s_i . e_{ci} . H_{ui}\right) + \sum_j \left(s_i . r_{cij} . K_{uij}\right)$$

where the scaling factor, s_i is:

$$s_i = \frac{Y_{ui}}{\hat{Y}_{ui}}$$

And Y_{ui} is actual gross mixed income.

Splitting gross mixed income *continued*

27.49 Proprietors' capital income for industry *i* is given by:

$$Y_{ki} = \sum_j \left(s_i \cdot r_{cij} \cdot K_{uij} \right)$$

27.50 Proprietors' labour income is given by:

$$Y_{li} = \left(s_i \cdot e_{ci} \cdot H_{ui} \right)$$

Capital and labour shares of net taxes on production and imports

27.51 Individual taxes and subsidies are allocated to capital and labour where possible.

27.52 The taxes on capital that can be separately identified are:

- land tax;
- local government authority rates;
- motor vehicle registrations;
- stamp duties; and
- miscellaneous taxes.

27.53 The taxes on labour are:

- payroll tax; and
- fringe benefits tax.

27.54 In those cases where the tax cannot be allocated exclusively to capital or labour it is allocated in proportion to labour and capital factor incomes.

Aggregation of capital services within each industry

Formation of capital services indexes for each industry

27.55 Rental prices are used to form the weights used to aggregate the estimates of productive capital stock of each asset type, *j*, for each of the corporate and household sectors within each industry, *i*, to form a Tornqvist index of industry capital services. Thus:

$$C_{it} = \frac{K_{it}}{K_{i(t-1)}} = \prod_j \left(\frac{K_{ijt}}{K_{ij(t-1)}} \right)^{W_{ijt}}$$

$$\text{and } W_{ijt} = \left(\frac{r_{ijt} \cdot K_{ijt}}{\sum_j r_{ijt} \cdot K_{ijt}} + \frac{r_{ij(t-1)} \cdot K_{ij(t-1)}}{\sum_j r_{ij(t-1)} \cdot K_{ij(t-1)}} \right) \div 2$$

where C_{it} = capital service flow index from period *t-1* to period *t*

K_{ijt} = real productive capital stock at time *t*, and

W_{ijt} = capital stock weights at time *t*

Formation of capital services indexes for each industry continued

$$r_{ijt} = T_{ijt} \cdot p_{ijt} \left(i_{it} + d_{ijt} - g_{ijt} \right) + p_{ijt} \cdot x_{it} \qquad (4)$$

where, for industry i and asset type j:

r_{ijt}	=	the rental price
T_{ijt}	=	the income tax parameter
i_{it}	=	the nominal internal rate of return
p_{ijt}	=	price deflator for new capital goods
$g_{ijt} = \frac{p_{ijt} - p_{ij(t-1)}}{p_{ijt}}$	=	the capital gain/loss effect due to the revaluation of assets
$d_{ijt} = \frac{D_{ijt}}{N_{ijt}}$	=	the depreciation rate
D_{ijt}	=	real economic depreciation (consumption of fixed capital)
N_{ijt}	=	real net capital stock
x_{it}	=	the effective average non-income tax rate on production
t	=	a discrete time variable

27.56 For agricultural land and inventories, the depreciation rate is assumed to be zero. For non-agricultural land the depreciation rate is assumed to grow at half the depreciation rate of non-dwelling construction.

27.57 A price index has been constructed for non-agricultural land by weighting together industrial land price indexes for Australian capital cities, obtained from commercial sources. The indexes go back to 1975–76 and are weighted together using 1989–90 benchmark estimates of non-agricultural land and the net capital stock in non-dwelling construction. An adjustment is applied so that the price index also represents other types of non-agricultural land such as office spaces and retail outlets. Between 1964–65 and 1975–76, the CPI is used.

27.58 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:

$$T_{ijt} = \frac{1 - u_t \cdot z_{ijt} - u_t \cdot a_{ijt}}{1 - u_t} \qquad (5)$$

where

u_t	=	the corporate profit tax rate
Z_{ijt}	=	the present discounted value of one dollar of depreciation allowances
a_{ijt}	=	the additional allowance rate

Formation of capital services indexes for each industry continued

27.59 Before the rental prices are calculated for each asset and industry, equation (4) is used to solve for an implicit rate of return, i_{it}, rather than using a market interest rate.

27.60 Computing the internal rate of return empirically is necessary because the rate of capital gain can be greater than the market interest rate plus depreciation. For the corporate sector, i_{it} is solved for all assets in each industry by assuming that capital income equals the rental price multiplied by the real productive capital stock in each industry:

$$Y_{it} = \sum_j r_{ijt} . K_{ijt} \qquad (6)$$

and substituting for the rental price in equation (4) giving:

$$Y_{it} = \sum_j K_{ijt} \left(T_{ijt.} p_{ijt} \left(i_{it} + d_{ijt} - g_{ijt} \right) + p_{ijt} . x_{it} \right), \text{ and so}$$

$$i_{it} = \frac{Y_{it} - \sum_j K_{ijt} \left(T_{ijt.} p_{ijt} \left(d_{ijt} - g_{ijt} \right) + p_{ijt} . x_{it} \right)}{\sum_j K_{ijt} . T_{ijt} . p_{ijt}} \qquad (7)$$

Measurement of income tax parameter

27.61 The inclusion of the tax parameters in the rental price removes some of the distortions to the rental price due to different tax allowances for different capital items and industries over time. 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.

Corporate profit tax rate

27.62 Corporate profit tax rates are obtained from the National Income Forecasting Model (NIF).

Depreciation allowances

27.63 The depreciation allowance is based on the present value of the discounted 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 Australian Taxation Office 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*. From 1980, the nominal discount rate is based on the average of small overdrafts (less than $100,000), and large overdrafts ($100,000 and over).

27.64 Specific Australian Taxation Office rulings on eligible depreciation allowances are obtained from Master Tax Guides. Of the two depreciation schedules permitted, the *diminishing value* method has been chosen; it geometrically depreciates at 150 per cent of the straight-line rate (the other schedule permitted). From 1980, however, 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. Broad banding has had the effect of shortening the lives of most assets.

27.65 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.

27.66 While the depreciation allowance has never been available for non-dwelling construction, in 1980 the Australian Taxation Office 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.

27.67 Finally, tax parameters account for a period in 1974–76 when double depreciation allowances were permitted for most assets. 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.

Additional allowance rate

27.68 The additional allowance rate is an immediate write-off which results in tax savings. The value of an allowance is the tax saving, which is the product of the tax rate and the amount of the allowance. For example, if the allowance rate is 20 per cent and the profit tax rate is 50 per cent, then the company effectively saves 10 per cent of the purchase price of the asset in tax savings (50 per cent x 20 per cent = $u.a$ (the corporate profit rate times the additional allowance rate)).

27.69 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. The write-off was immediate, so discounting was not necessary. Its value to the company is the value of the allowance multiplied by the profit tax rate.

Measurement of income tax parameter continued

27.70 Special allowances include:

Allowance	Period
10 per cent for most equipment	8 Feb.1993–30 June 1995
18 per cent for most equipment	1 May 1981–30 June 1985
20 per cent for most equipment	1 July 1978–30 April 1981
40 per cent for most equipment	1 Jan. 1976–30 June 1978
20 per cent for farm and forestry	expired 1973
20 per cent for manufacturing	7 Feb. 1962–30 June 1975, excluding 4 Feb. 1972–13 Feb. 1973

27.71 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.

Non-income business tax rate

27.72 The second tax parameter, $p.x$, is the tax rate for current price non-income business taxes (i.e. taxes on production and imports allocated to capital). The variable, x, is the current price value of non-income business taxes divided by the current price net capital stock. The ratio is then inflated to reflect the effects of inflation.

27.73 Benchmark non-income business taxes on capital are obtained from the 1994–95 supply and use tables. The taxes on capital are:

- land tax;
- local government authority rates;
- motor vehicle registrations;
- stamp duties; and
- miscellaneous taxes

27.74 The benchmark estimates of non-income business taxes on capital are extrapolated to cover the period from 1964–65 onwards using total other taxes less subsidies as an indicator series, and allocated to market sector industries using industry shares of output as an indicator.

Accuracy, quality and reliability of productivity measures

27.75 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. Furthermore, because productivity growth is comparatively low, such errors assume relatively greater importance with respect to productivity estimates.

Accuracy, quality and reliability of productivity measures *continued*

27.76 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.

Impact of lags in hours worked and the business cycle

27.77 It can be demonstrated that the growth of hours worked tends to lag the growth of output. Analytical work undertaken within the ABS (N. Batty, *Gross Domestic Product, Employment and Productivity*, June quarter 1989 issue of *Australian National Accounts: National Income and Expenditure* (Cat. no. 5206.0)) suggests that over the 20 years up to 1988 the lag at turning points in the business cycle varied between zero and four quarters, with the average being between two and three quarters. The implication is that estimates of labour productivity are likely to decline as a peak in a business cycle is approached, particularly if rapid growth in GDP is abruptly ended as in 1986. Conversely, labour productivity estimates are likely to grow strongly when the economy emerges from a cyclical trough.

Labour productivity analysis at the industry level

27.78 Several problems of measurement at the industry level should be considered when examining estimates of gross value added per unit of labour. An apparent productivity increase in one particular industry may be the result of changes in the way production is organised between industries. For example, a productivity gain which, in the ABS measures, is attributed to the Construction industry may be the consequence of the greater use of prefabricated materials (produced by another industry), thereby changing the ratio of labour to other inputs in the Construction industry. However, while the productivity of both industries in combination may have increased, the measured productivity in the supplying industry could well show a decline if the new work is more labour intensive than work in the remainder of that industry. It follows that if, over a period of time, one industry records a higher growth than others in volume measures of gross value added per unit of labour, it is not necessarily a consequence of greater productivity of labour in that industry. The higher growth could be attributable to changes in other sectors of the economy or innovations resulting from some work now being undertaken in other industries.

CHAPTER 28 STATE ACCOUNTS

INTRODUCTION

28.1 *Australian National Accounts: State Accounts* (Cat. no. 5220.0) contains annual estimates of gross state product and its principal expenditure and income components—government and household final consumption expenditure, private and public gross fixed capital formation, international trade, compensation of employees, gross operating surplus, gross mixed income, and taxes less subsidies on production and imports by State and Territory. Components of total factor income are shown by ANZSIC industry for each State and Territory. Detailed estimates of household income and agricultural income by State and Territory are also provided.

28.2 *Australian National Accounts: Quarterly State Details* (Cat. no. 5206.0.40.001) contains quarterly estimates of domestic final demand, international trade in goods, and compensation of employees by State and Territory. The term 'State final demand' is conceptually identical to domestic final demand at the national level (the sum of private and government final consumption expenditure and private and public gross fixed capital formation). Throughout this chapter 'State' is used to mean 'State and Territory'.

CONCEPTS

28.3 National estimates are based on the concepts and conventions embodied in SNA93, but for regional estimates there is no separate international standard. Although national concepts are generally applicable to State accounts, there remain several conceptual and measurement issues that either do not apply or are insignificant nationally. Most of the problems arise in the measurement of gross state product for the transport and storage, communication services, and finance and insurance industries, where production often takes place across State borders. In these cases, a number of conceptual views can be applied to the allocation of value added by State.

28.4 Allocation of national accounting aggregates from the gross domestic product account by State is dependent on the data available from a wide range of ABS collections. The suitability of these data sources for this purpose is in turn dependent on the statistical unit or units to which the collections relate. As indicated in Chapter 5, the units model underlying the ASNA comprises the following units:

- legal entity;
- enterprise group;
- enterprise;
- management unit;
- establishment; and
- location.

Full definitions for each of the statistical units in the model are given in Chapters 5 and 6. The brief definitions below omit certain qualifications/exceptions.

- The *legal entity* is 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 for statistical purposes include companies, partnerships, trusts, sole business proprietorships, government departments and statutory authorities.
- The *enterprise group* is a 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 necessarily required for control to be exercised.
- The enterprise is a unit covering all legal entities within an enterprise group classified to a single subsector of the *Standard Institutional Sectors of Australia* (SISCA).
- The *management unit* is the largest type of unit within an enterprise group which controls its productive activities and for which accounts are kept. From these accounts detailed annual and sub-annual (i.e. at least quarterly) revenue, expenses, inventories, capital formation and employment data must be available to the ABS. This will enable measures of industry performance, such as gross product, to be calculated. It is a component unit of the enterprise(s) and consists, in turn, of one or more establishments.
- The *establishment* is the smallest type of accounting unit within a management unit which controls its productive activity. It consists in most industries of one or more locations in a State/Territory of Australia at (or from) which it operates. From its accounts the full range of detailed revenue, expense, employment and inventories data must be available to the ABS at least annually, including data enabling establishment value added to be calculated.
- The *location* is a site, occupied by an establishment, at/or from which the establishment engages in productive activity on a relatively permanent basis. An establishment may operate from one or more locations. In specified circumstances, non-contiguous sites occupied by the same establishment can be combined to form a location. It can also consist of a site at which the establishment is undertaking capital expenditure with the intention of commencing productive activity on a relative permanent basis at some time in the future (a location not yet in operation).

28.5 Most economic collection used in the compilation of State accounts are conducted in respect of management units or establishments. Economic collections based on the establishment unit are the most appropriate for compiling State accounts aggregates from the domestic product account because, for most industries, they relate to the productive activity undertaken within a particular State. However, for some industries the establishment is not confined to a single State.

28.6 The definition of the establishment adopted for each industry class is provided in the *Australian and New Zealand Standard Industrial Classification* (ANZSIC). The establishment is not confined to a single State for the communication services industry, for a significant number of classes in the transport industry, and for defence, research and scientific institutions. By definition, the operations of such units are not delineated on a State basis, even though operations are carried out at locations throughout Australia (an example being Telstra). For these industries, the convention of notional State producer units has been adopted. Such units are notional because of the non-availability of gross operating surplus and value added in respect of them. Various indirect indicators of activity are used to allocate total gross operating surplus across individual States to obtain estimates for the notional State producer units in each of these industries.

28.7 The concept of a single location encompasses the notion of a base of operations which is relevant in situations where operations are carried out by a mobile work force. Accordingly, in certain industries where mobile work forces exist, such as fishing and construction, a single physical location unit applies even though all its economic activity does not take place within the confines of that location.

28.8 For those ABS economic collections which are based on the management unit it is not possible to directly compile estimates by State by classifying each management unit to a particular State. However, such collections usually include a dissection of some data items such as employment, total turnover or total sales. These dissections are obtained by asking each respondent to provide a State split for a very limited number of data items. In the absence of genuine establishment data, the State data collected from management unit collections are used as a proxy for allocating aggregates such as gross operating surplus and gross mixed income by State.

CURRENT PRICE ESTIMATES—ANNUAL

Gross state product and total factor income

28.9 The estimates of gross state product are produced by summing the income components of gross state product: compensation of employees, gross operating surplus, gross mixed income, and taxes less subsidies on production and imports. Total factor income is derived by summing compensation of employees, gross operating surplus and gross mixed income. Estimates of total factor income by State and Territory are compiled by industry at the ANZSIC Division level. However, State by industry estimates are not available for gross state product as industry estimates are not available at the State level for taxes less subsidies on production and imports.

Compensation of employees

28.10 State by industry estimates of compensation of employees (COE) are derived from essentially the same data sources as those used for the national estimates. They are derived as the sum of the following five elements:

- private sector wages and salaries, which consist of wages and salaries paid to employees of the private sector and are obtained from the quarterly survey of employment and earnings (SEE); non-farm wages and salaries, which are out of scope of SEE (referred to as unrecorded wages); farm wages and salaries; the value of fringe benefits paid to private sector employees; and labour income earned by non-residents working for the residential non-official sector in Australia;
- government wages and salaries, which consist of wages and salaries paid to government employees (obtained from SEE); defence force salaries and allowances; the value of fringe benefits paid to government employees; payments to the staff of Australian embassies and consulates overseas; labour income earned by non-residents working for the residential official sector abroad less labour income earned by residents working for non-resident employers in Australia;
- superannuation contributions paid by private employers;
- superannuation contributions (including imputed contributions) paid by government; and
- workers' compensation premiums.

28.11 Not all the information is available on a State by industry basis, so a matrix consisting of available State by industry data is constructed for total compensation of employees. The matrix is balanced to two sets of control totals using a mathematical estimation technique known as the residual allocation system (RAS). The first control total is the total of all industries for each State or Territory, while the second is the total of each industry for all States and Territories combined. RAS is a procedure which requires the successive scaling of column and then row elements by successively prorating to column totals and row totals until the matrix elements are fully reconciled with both row and column control totals. The number of iterations required will depend on the consistency of the initial data matrix with the row and column control totals. The accuracy of the final matrix derived will depend on the suitability of the initial matrix as an indicator.

Compensation of employees *continued*

28.12 There is a minor difference in definition between COE in the gross product tables and the household income tables, for both the national and the State estimates. The reason for this difference is discussed in Chapter 19.

Gross operating surplus plus gross mixed income

28.13 Estimates of gross operating surplus (GOS) plus gross mixed income (GMI), by State and industry, are generally derived by allocating the national industry estimates of GOS plus GMI by State. However, GOS for general government is allocated by State only in total, not by industry. Consequently, the sum of GOS for non-financial corporations, financial corporations and dwellings owned by persons, and GMI for unincorporated enterprises, is allocated by State for each industry other than public administration and defence. The abbreviation 'GOSMI' will be used in the following discussion to represent the aggregate GOS (excluding GOS for general government) plus GMI.

28.14 Taxation Statistics are the principal data source for national estimates of GOS for private non-financial corporations and non-farm unincorporated enterprises for years up to 1993–94. For later years, EASTAX data (combined data from the Economic Activity Survey and the business income tax source) are used to compile annual balanced supply and use tables which provide the annual industry benchmarks. Taxation Statistics are not suitable as a data source for State estimates for non-financial corporations, as the taxation return for an individual company relates to the legal entity, which may be engaged in production in more than one State. The major data sources used in deriving State GOSMI estimates are ABS economic censuses and surveys, government finance data, Taxation Statistics, and other indicators such as wages and salaries and employment data.

28.15 The ABS system of integrated economic censuses and surveys collects State data for selected industries on either an establishment or a management unit basis. Where available, they are used as the basic data source for allocating GOSMI by State.

28.16 The methods used for estimating GOSMI by industry by State are summarised below. Since the compilation methods vary between industries, an industry by industry description is given. The industries referred to are based on the industry classification described in *Australian and New Zealand Standard Industrial Classification* (ANZSIC) (Cat. no. 1292.0).

Agriculture, forestry and fishing

28.17 Agriculture GOSMI by State is obtained as a by-product of national statistical estimation. The methods and data sources used to derive State estimates are much the same as those used to derive estimates for Australia. Except for the latest year State splits of the gross value of production and farm costs are obtained respectively from *Agriculture, Australia* (Cat. no. 7113.0) and the Agricultural Finance Survey. For the latest year the only State estimates that are available are volumes for major crops (from ABARE) and ABS data on livestock slaughterings. For all other components of production and for all farm costs State estimates for the latest year are based on the State distributions from the previous year. Estimates of GOSMI for forestry and fishing are allocated to States in line with income tax-based estimates of GMI for unincorporated enterprises classified to forestry and fishing. GOS for State and local public non-financial corporations classified to forestry and fishing are allocated to States directly using data provided by the ABS Public Finance Section.

Mining

28.18 ABS economic censuses and surveys data (from *Mining, Electricity and Gas Operations, Australia, Preliminary* (Cat. no. 8401.0) and *Mining Operations Australia* (Cat. no. 8415.0)) for mining value added less wages and salaries by State are used to derive State splits of the Australian total for mining GOSMI. Bass Strait and North West Shelf oil and gas production are regarded as occurring on the domestic territory of Victoria and Western Australia, respectively. Oil and gas production in the Timor Gap is divided between the Northern Territory and Western Australia on the basis of which State has administrative control under the *Petroleum (Australia-Indonesia Zone of Cooperation) Act 1990.*

Manufacturing

28.19 Industry gross value added less wages and salaries by State, from *Manufacturing Industry, Australia* (Cat. no. 8221.0), is used to derive State splits of the Australian total for manufacturing GOSMI.

Electricity, gas and water supply

28.20 Estimates for GOS of public non-financial corporations by State are derived from the same sources as those used for the national estimates. For public non-financial corporations, government finance information, which is based on the enterprise as the statistical unit, is supplemented by information from economic censuses and surveys to transfer the coal mining activities of some State electricity authorities to the mining sector. GOS of the Snowy Mountains Hydro Electricity Authority is allocated wholly to New South Wales. The remaining portion of GOSMI is allocated to States using economic censuses and surveys data from *Electricity, Gas, Water and Sewerage Industries, Australia* (Cat. no. 8208.0).

Construction

28.21 The Australian total for GOSMI is allocated to States using benchmark data from *Private Sector Construction Industry: Private Sector Construction Establishments, Details of Operations, Australia* (Cat. no. 8772.0). Data are interpolated between benchmarks and extrapolated after the latest benchmark using a composite indicator derived from the following components:

- State data for the value of work done by the private sector for the public sector, obtained from *Engineering Construction Activity, Australia* (Cat. no. 8762.0); and
- State data on gross fixed capital formation for dwellings, and for other buildings and structures.

Wholesale trade

28.22 Benchmark estimates for GOSMI for 1991–92 were derived using Retail Census data for that year, as the ABS collection for the wholesale industry in respect of that year did not provide any State information. Retail turnover from *Retail Trade, Australia* (Cat. no. 8501.0) is used to extrapolate the 1991–92 State estimates of GOSMI.

Retail trade

28.23 Benchmark data to allocate the Australian total for GOSMI across States for 1991–92 were obtained from *Retail Industry, State and Territory Summary* (Cat. no. 8625.0). These benchmarks are extrapolated on the basis of indicator data comprising retail turnover from *Retail Trade, Australia* (Cat. no. 8501.0).

Accommodation, cafes and restaurants

28.24 State indicator data are obtained from *Accommodation Industry, Australia* (Cat. no. 8695.0) and *Clubs, Pubs, Taverns and Bars, Australia* (Cat. no. 8687.0). A composite indicator is derived to allocate GOSMI for Australia by State.

Transport and storage

28.25 GOS for State and local public non-financial corporations is directly allocated to States using data supplied by the ABS Public Finance Section. Because the activity of national public non-financial corporations crosses State borders, indirect indicators are used to allocate GOS of this subsector to States. The remaining GOSMI is split into components of transport and storage which are then allocated to States using a variety of activity indicators. Examples of these indicators include domestic and international passenger traffic through Australian airports from the Department of Transport and Regional Services, overseas shipping and cargo movements, appropriate components of household final consumption expenditure by State, household income by State and in some cases mean population by State.

Communication services

28.26 Public non-financial corporations GOS is split by State using wages and salaries data for Telstra and Australia Post. The remaining portion of GOSMI is allocated to States using appropriate components of household final consumption expenditure.

Finance and insurance

28.27 Labour force employment data by State by ANZSIC Subdivision for this industry are used for the State allocation of Australian control totals for GOSMI.

Property and business services

28.28 State ratios for allocating GOSMI were derived using turnover from the following ABS publications covering business and professional services: *Legal and Accounting Services, Australia* (Cat. no. 8678.0); *Real Estate Agents Industry, Australia* (Cat. no. 8663.0); *Technical Services, Australia* (Cat. no. 8676.0); *Computing Services Industry, Australia* (Cat. no. 8669.0); and *Consultant Engineering Services, Australia* (Cat. no. 8693.0).

28.29 The latest reference year for which these publications are available is 1995–96, except for Cat. no. 8676.0 which related to 1992–93. For subsequent years it has been possible to update the State allocations for the real estate component using State data for ownership transfer costs. Similarly, consulting engineering has been updated using State data on the value of work done from the quarterly publication *Engineering Construction Activity, Australia* (Cat. no. 8762.0). Apart from real estate and engineering, State ratios for the other components of property and business services have been held constant since 1995–96.

Education

28.30 Household final consumption expenditure on education by State is used to split the Australian total for GOSMI by State.

Health and community services

28.31 Australian estimates of GOSMI are calculated separately for health and for community services. Household final consumption expenditure by State for doctors, hospitals and dentists is used to split the Australian estimate for health GOSMI by State. Movements in mean population are used to extrapolate 1995–96 benchmarks for community services by State which were derived from *Community Services, Australia, Preliminary* (Cat. no. 8694.0). The respective State estimates for health and for community services are then summed to derive the State estimates for health and community services.

Cultural and recreational services

28.32 Public non-financial corporations GOS is allocated to States using data supplied by ABS Public Finance Section. The private sector portion of GOSMI is allocated to States using a variety of economic activity indicators. These indicators include HFCE admissions data by State, HFCE other recreation data by State, HFCE gambling data by State, and radio and television stations GOS by State from the Australian Broadcasting Tribunal *Annual Report*.

Personal and other services

28.33 Public non-financial corporations GOS is allocated to States using data supplied by ABS Public Finance Section. HFCE on other services is used as an indicator to derive the State split of private sector GOSMI.

Ownership of dwellings

28.34 State estimates of GOS for ownership of dwellings are derived using the same data sources and methodology as used for the national estimates (see Chapter 20).

General government

28.35 General government GOS comprises only consumption of fixed capital (COFC) and is allocated to States in two parts. 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. The allocation of national general government COFC to individual States is based on a similar model of accumulated gross fixed capital formation since 1961–62.

Taxes less subsidies on production and imports

28.36 Taxes and subsidies on production and imports relating to the State and local general 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, and that any subsidies paid by a State government are paid to resident entities of that State.

28.37 Taxes and subsidies on production and imports relating to the Commonwealth Government are allocated to States at a detailed level using the most appropriate indicators available for each tax or subsidy. Commonwealth taxes on agricultural products are allocated by State using production data which are generally published in *Livestock Products, Australia* (Cat. no. 7215.0). Examples follow of the sources used for allocation of Commonwealth taxes and subsidies. Taxes on international trade are allocated by State using data from the ABS International Trade Section. Sales tax is allocated by State using appropriate components of HFCE. The mining diesel fuel rebate subsidy is allocated by State using data published in *Australian Mining Industry* (Cat. no. 8414.0). Most agricultural subsidies are allocated in line with the gross value of farm production for the relevant commodity.

Agricultural income

28.38 State estimates of agricultural GOSMI and agricultural income are derived by dissecting the Australian estimates for the relevant components. Gross value of production is available by State in *Agriculture, Australia* (Cat. no. 7113.0). Production costs (marketing, seed and fodder, and other costs) and the production valuation adjustment are distributed by State using area and production statistics in *Agriculture, Australia* (Cat. no. 7113.0), and in *Livestock Products, Australia* (Cat. no. 7215.0). Compensation of employees is available by State from the Agricultural Finance Survey. Estimates of consumption of fixed capital, interest and land rent are allocated to States using information from Taxation Statistics as an indicator. The taxes less subsidies on production and imports component is split by State using gross value of production data for relevant commodities.

Household income

28.39 State estimates of household income and uses of income are derived by aggregating separate State estimates for each of the components. Except for COE and GOS from dwellings owned by persons, State estimates are derived by dissecting the Australian estimates, using a variety of indicators.

28.40 State estimates of COE are an aggregation of the quarterly estimates described below. There is a difference between COE estimates in the household income account and in the gross domestic product account. The former account measures COE earned by residents of Australia; the latter account measures COE paid out of Australian production (see paragraph 28.53 for a description of the adjustments made for labour income to and from overseas).

28.41 Estimates of GMI by State are obtained by adding the agriculture and non-agriculture components, which are compiled separately. State estimates of GMI of agricultural unincorporated enterprises are derived as the difference between total agricultural GOS (discussed above) and agricultural GOS of non-financial corporations, which is split by State in the same proportion as total agricultural GOS. GMI of non-agricultural unincorporated enterprises is dissected by State using the proportions calculated from Taxation Statistics.

28.42 State estimates of GOS from dwellings owned by persons are prepared using the same data sources and methodology used to prepare the national estimates (see Chapter 20). Transfers from general government are allocated to States using data from the following publications of the Commonwealth Department of Social Security: the June issue of *Characteristics of Pensioners,* the quarterly *Survey of Unemployment Recipients* and the six-monthly *Summary of Statistics*. Interest imputed on life insurance funds is allocated to States using the aggregate for all other components of household income as an indicator, while interest imputed on private and public superannuation funds is distributed using the respective State distributions of compensation of employees for the private and public sectors. Interest imputed to households in relation to the Commonwealth Government's unfunded superannuation arrangements is allocated to States using Commonwealth general government compensation of employees.

28.43 The other components of household income and uses of income are distributed to States using the following indicators:

- Taxation Statistics, for income tax payable, property income payable by unincorporated enterprises and the property income receivable component of primary income receivable;
- data from the ABS Public Finance Section, for social assistance benefits, current transfers to non-profit institutions and other current taxes on income, wealth, etc.;
- financial enterprises data on depositors' balances and personal and housing loan commitments, for property income payable on dwellings and consumer debt interest;
- data from the ABS Balance of Payments Section for other current transfers receivable from and payable to non-residents (included within other current transfers receivable and payable); and
- data on the gross value of agricultural production for the rent on natural assets component of other property income.

Household final consumption expenditure

28.44 Annual estimates of household final consumption expenditure by State are the sum of the quarterly estimates described in paragraphs 28.55 and 28.56.

Private gross fixed capital formation

28.45 Annual estimates of private gross fixed capital formation by State are the sum of the quarterly estimates described in paragraphs 28.57 and 28.58.

National general government final consumption expenditure and gross fixed capital formation

28.46 The treatment of national general government final consumption expenditure in regional accounting is rather problematic. Alternative treatments are to attribute final expenditures to the region in which the expenditure was incurred, or to the region in which the beneficiaries reside, or even to consider the national general government consumer unit as extraterritorial and therefore to exclude it from all regions. For practical reasons the first approach has been adopted, although it still requires extensive use of indirect indicators. An implication is that a large proportion of the consumption of national general government services is included in State final demand (SFD) for the Australian Capital Territory, inflating the balancing item for that Territory. If data were available to allocate national general government final consumption expenditure to end users, the balancing item for the Australian Capital Territory would be a much smaller negative, or even a positive, because the provision of the services would be regarded as an interstate export instead of consumption expenditure in the Australian Capital Territory. Estimates for national general government expenditures in the States, on both an annual and a quarterly basis, must therefore be treated with considerable caution.

28.47 The COE component of national general government final consumption expenditure is directly apportioned to States using data from the ABS Survey of Employment and Earnings and information supplied by the Department of Defence. Expenditures on goods and services classified to defence are allocated according to population, while non-defence purchases are allocated on the basis of national general government employment by State and Territory.

28.48 National general government gross fixed capital formation on dwellings and other buildings and structures is allocated to States and Territories using historical annual State dissections for projected construction expenditure in each State and Territory, published by the Department of Industry, Science and Resources. Expenditure on machinery and equipment is allocated using national general government employment by State and Territory. Expenditure on intangible fixed assets is allocated to States using a variety of allocators. Intangible fixed assets comprise computer software, mineral exploration, and artistic originals. Expenditure on computer software is based on estimates derived from *Government Use of Information Technology, Australia, 1993–94* (Cat. no. 8119.0), from the value of imported software, from data supplied by the ABS Public Finance Section, and from data collected in respect of expenditure on computers and computer software associated with activities to ensure that the Commonwealth public sector

National general government final consumption expenditure and gross fixed capital formation *continued*

was Year 2000 compliant. Expenditure on mineral exploration is based on data from *Mineral and Petroleum Exploration, Australia* (Cat. no. 8412.0). Expenditure on artistic originals is based on reports supplied by the Australian Film Commission, and on data from *Film and Video Production and Distribution, Australia* (Cat. no. 8679.0). State dissections of expenditure on intangible fixed assets are based on the sources listed above or more general indicators if actual State details are not available.

State and local general government final consumption expenditure and gross fixed capital formation

28.49 Data for State and local general government final consumption expenditure and gross fixed capital formation are supplied by the ABS Public Finance Section. State general government data are extracted from administrative by-product sources such as financial statements prepared for State government budget papers and Auditors'-General Reports, and supplementary departmental documents, and by direct collection from general government units. The extracted data are coded using the Government Finance Statistics (GFS) standardised classification framework, which allows data for individual units to be aggregated to the required level. For local government final consumption expenditure, an annual ABS questionnaire is used to collect data from local government authorities in some States, while in others the data are jointly collected through the Commonwealth Grants Commission or the State Department of Local Government. A joint ABS/Commonwealth Grants Commission annual return on capital formation is collected from each local government authority in Australia. Gross fixed capital formation transactions are classified by type of asset and purpose. Data are allocated directly by State on the assumption that each State's activities are confined within its own borders.

Public financial and non-financial corporations' gross fixed capital formation

28.50 For Commonwealth non-financial corporations' gross fixed capital formation on tangible fixed assets, various allocators are applied at the individual corporation level. Direct allocation is possible in a few cases where corporations operate wholly in one State. For some corporations State-level direct indicators are available from either the ABS Engineering Construction Survey or from published accounts. For other corporations, indirect allocations are used—for example, purchases of ships and aircraft are allocated using general freight and passenger activity through ports and airports in each State, consistent with the allocation of gross operating surplus for the Transport industry. Data for Commonwealth financial corporations are allocated by State on the basis of population. Data for State and local non-financial corporations are allocated directly to their State of operation. Gross fixed capital formation for State and local public financial corporations is allocated by State using data from the annual Public Financial Corporations Survey of Capital Expenditure. State dissections for capital expenditure on software are based on data from *Information Technology, 1995–96* (Cat. no. 8126.0).

CURRENT PRICE ESTIMATES—QUARTERLY

Compensation of employees

28.51 Quarterly estimates of COE, which are prepared for all industries combined, are derived as the sum of State estimates of the components described for the national estimates in Chapter 19. The method used to compile COE by quarter is also described there. The following data sources are used for quarterly State estimates of wages and salaries.

28.52 Wages and salaries paid in cash to employees of the private and civilian government sectors are based on the Survey of Employment and Earnings (SEE), and the Labour Force Survey. Defence force salaries and allowances are available by State from annual information supplied by the Department of Defence. Quarterly estimates for the latest incomplete year are available for Australia from the Commonwealth Department of Finance and Administration Ledgers, and are allocated to States using the State distribution for the previous year. Quarterly rural wages and salaries are allocated by State using annual data from the Agricultural Finance Survey. Benchmark data for State estimates of the value of fringe benefits paid to private sector employees are available from the periodic Survey of Major Labour Costs. Quarterly estimates for the latest incomplete year are trended. For the value of fringe benefits paid to government employees, annual State estimates are divided into quarters using wages data from SEE as the indicator. For the latest incomplete year the quarterly estimates are derived on trend. Payments to the staff of Australian embassies and consulates overseas are allocated to the Australian Capital Territory.

28.53 Adjustments for labour income to and from overseas are allocated separately to States. Labour income earned by residents working abroad for non-resident employers is allocated across States each quarter using total earnings in each State as the indicator. Labour income earned by residents working for non-resident employers in Australia is allocated to States using fixed proportions. Labour income earned by non-residents working for the resident official sector abroad is allocated to the Australian Capital Territory. Labour income earned by non-residents working for the resident non-official sector in Australia is allocated to States using SEE data as the indicator.

28.54 Employer social contributions, which comprise employer contributions to superannuation and workers' compensation premiums, are generally allocated to quarters separately for the private and public sectors in line with movements in wages and salaries. However, specific adjustments have been required over recent years to allow for the impact of the Superannuation Guarantee Levy on the timing of payments in respect of employer contributions to superannuation.

Household final consumption expenditure

28.55 Quarterly estimates of HFCE by State are calculated by dissecting the Australian estimate for each of the components described in Chapter 14. For some components, such as food, clothing and footwear, housing, furnishings and other household equipment, the data sources used to calculate the quarterly Australian estimates contain State data, e.g. the monthly Retail Survey and the publication *Consumer Price Index* (Cat. no. 6401.0). For other components such as cigarettes and tobacco, and communication services, no quarterly State data are available and State dissections are based on the latest annual State distribution derived from other sources including the periodic Household Expenditure Survey.

28.56 State data are available from the monthly Retail Survey for most of the goods components of HFCE. Imputed rent of owner-occupied dwellings is prepared using the same data sources as for the national estimates.

Private gross fixed capital formation

28.57 State estimates are derived largely from the same sources as used for the Australian estimates, although a higher degree of approximation is required. Estimates of private gross fixed capital formation on dwellings and other buildings and structures are derived using data from the ABS quarterly surveys of Building Activity and Engineering Construction, while expenditure on machinery and equipment is derived from the quarterly Survey of Private New Capital Expenditure. State estimates of livestock are based on annual data from *Agriculture, Australia* (Cat. no. 7113.0) and *Livestock Products, Australia* (Cat. no. 7215.0). Annual estimates are allocated evenly over the quarters of each financial year.

28.58 Intangible fixed assets include: computer software; entertainment, literary or artistic originals; and mineral exploration. State estimates for computer software are currently based on State splits of income for the information technology and telecommunications (IT&T) industries. It is expected that future estimates will be based on IT&T industry expenditure and/or employment data. State estimates for music originals are based on data supplied by the Australian Recording Industry Association. State estimates for other entertainment and artistic originals are based on annual totals for Australia, allocated to State by population and other indirect indicators. State details for mineral and petroleum exploration expenditure are available from *Mineral and Petroleum Exploration, Australia* (Cat. no. 8412.0). Ownership transfer costs are derived from stamp duty data supplied by the various State governments, and various other data such as the number of real estate property transfers by State. Essentially, these are the same as the data sources used to prepare the Australian estimates.

National general government final consumption expenditure and gross fixed capital formation

28.59 The COE component of national general government final consumption expenditure is directly apportioned to States using data from the ABS Survey of Employment and Earnings and information supplied by the Department of Defence. Expenditures on goods and services classified to defence are allocated according to population, while non-defence purchases are allocated on the basis of national general government employment by State and Territory.

State and local general government final consumption expenditure and gross fixed capital formation

28.60 State and local general government final consumption expenditure and gross fixed capital formation are allocated directly by State, using data from the ABS Public Finance Section, on the assumption that their activities were confined to within their own State.

Public financial and non-financial corporations' gross fixed capital formation

28.61 Quarterly estimates of gross fixed capital formation for Commonwealth non-financial corporations are allocated by State using the proportions derived for the latest annual benchmark (see paragraph 28.50). Quarterly estimates for Commonwealth financial corporations are compiled using data from the quarterly Public Financial Corporations Survey of Capital Expenditure, benchmarked to the corresponding annual estimates. Quarterly estimates for State and local gross fixed capital formation for non-financial corporations are allocated directly by State on the assumption that their activities are confined to within their own State, using data from the ABS Public Finance Section. Quarterly estimates for State and local financial corporations are compiled using data from the quarterly Public Financial Corporations Survey of Capital Expenditure, benchmarked to the corresponding annual estimates.

CHAIN VOLUME ESTIMATES

Government and household final consumption expenditure

28.62 Chain volume estimates of government and household final consumption expenditure for Australia are derived by aggregating the volume estimates for the States using a bottom-up approach. The State volume estimates are derived using State-specific price indexes. See Chapter 14 for details.

Private gross fixed capital formation

28.63 Chain volume estimates of private gross fixed capital formation for Australia are derived by aggregating the volume estimates for the States using a bottom-up approach. State-specific price indexes are used to derive the volume estimates for GFCF in dwelling and non-dwelling construction. National price indexes are used to derive the volume estimates for GFCF in machinery and equipment and intangibles, although account is taken of the different industry compositions within each State—industry patterns of GFCF by asset type vary. See Chapter 15 for details.

Public gross fixed capital formation

28.64 Quarterly chain volume estimates of public gross fixed capital formation for Australia are derived by aggregating the volume estimates for the States using a bottom-up approach. State-specific price indexes are used for GFCF in non-dwelling construction, but National price indexes are used to derive the volume estimates for the remainder of GFCF. Annual chain volume estimates of public GFCF by State are derived by aggregating the quarterly estimates and then constraining these estimates to be consistent with the national estimates. See Chapter 15 for details.

International trade in goods

28.65 Detailed estimates of current price exports of goods on a recorded trade basis at the two-digit level of the *Standard International Trade Classification Revision 3 (SITC Rev 3)* are revalued, generally using national rather than State-specific deflators, to produce volume estimates of these components. The exports data are on the basis of State of origin, i.e. the State in which the final stage of manufacture or production occurs. For most exports this should correspond to the basis required for State allocation, i.e. the State of final resident ownership. There is an assumption that the national deflators will usually provide a reasonable measure of change in price at the State level. Revaluation at the two-digit (division) level of SITC Rev 3 is a compromise giving a reasonable level of disaggregation by commodity type without increasing the magnitude of the revaluation exercise too significantly. In a very limited number of cases, more specific deflators have been used to replace the national deflator at the SITC Rev 3 division level. This has occurred in those cases where the composition of a particular division is known to be variable between States, and the division includes commodities with price movements which deviate significantly from the division average. Mineral and agricultural commodities are the most significant in this regard.

28.66 A similar approach has been adopted for imports of goods. The level of revaluation corresponds broadly to the commodity sub-group level of the balance of payments merchandise imports end-use classification of imports, i.e. two-digit *Broad Economic Classification (BEC)* by three-digit level of the SITC Rev 3. These data are on the basis of the State in which the imports were released from Australian Customs Service (ACS) control. In most cases this will correspond to the State of initial resident ownership, which is the required basis of State allocation. No information is available on which to base an adjustment for goods which are released from ACS control in a State other than that in which their owner resides.

28.67 The State estimates of exports and imports are benchmarked to the national estimates.

Compiling chain volume estimates of GSP

28.68 The methods used to obtain the chain volume estimates of GSP could be best described as 'indirect' because the only current price estimate of GSP available is obtained by aggregating the incomes accruing from production (i.e. the income approach). It is not possible to satisfactorily deflate such incomes to produce chain volume estimates because they do not comprise readily identifiable price and quantity elements. While it could be argued that the wages paid to an individual are equal to the product of the number of hours worked and the hourly wage rate, many employees are not paid according to the number of hours worked, and the supplements paid are generally independent of the number of hours worked. Moreover, from an employee's perspective, the value of wages and salaries has more to do with their purchasing power than with any hourly wage rate. Also, because gross operating

surplus is the residual flow of income to the owners of capital, after the payment of labour costs and taxes less subsidies on production and imports, there is no way of defining it as the product of a price and a quantity. However, while it is not possible to construct chain volume estimates of GSP by deriving chain volume estimates of the various income components at the detailed level, it is possible to deflate the total current price estimate of GSP if a suitable aggregate deflator can be constructed.

28.69 Expenditure on GSP (i.e. the expenditure approach to deriving GSP) comprises the following:

State final demand
plus changes in inventories;
plus international exports of goods;
plus international exports of services;
less international imports of goods;
less international imports of services;
plus interstate exports of goods;
plus interstate exports of services;
less interstate imports of goods; and
less interstate imports of services.

28.70 Current price and chain volume estimates of SFD (the sum of private and public expenditures on consumption and gross fixed capital) and international trade in goods are compiled and published, but there are no estimates of GSP using the expenditure approach. The reason is the lack of changes in inventories data by State and, most importantly, the lack of data relating to inter-state trade in goods and services. Consequently, the approach taken has been to develop State-specific deflators to deflate the current price estimates of GSP derived using the income approach by calculating a deflator covering as much as possible of GSP using the expenditure approach.

28.71 The approach adopted essentially involves deriving the best possible current and volume estimates of significant subsets of the above data items. For each State, current price estimates of the identified components are added to the current price estimates of SFD and international trade in goods and, similarly, the volume estimates of those components are calculated. The quotient derived by dividing the aggregate chain volume estimates into the aggregate current price estimates is a chain Paasche price index. This price index is used to revalue the current price estimates of GSP derived using the income approach. It is crucial to identify separately those components for which the deflators deviate significantly from the average, since the method adopted effectively attributes the weighted average deflator to the unidentified components. Available information on the State distribution of these data items has been drawn on where possible and alternative indicators, as detailed below, have been used in their absence. Nevertheless, the aggregate current and chain volume estimates used in deriving this deflator are not considered to be complete measures. They merely serve to produce the best deflators for the income based measure of GSP that the available data and resources allow.

Compiling chain volume estimates of GSP *continued*

28.72 In some instances, both the current and volume estimates of a component, or some approximation to them, are split by State using available indicators. In other instances, a split is derived for either a current or a volume estimate, and the corresponding volume or current price estimates are derived by deflation if the initial split is in terms of current price estimates, or by inflation if the initial split is in terms of volume estimates. There is limited price information available at the State level, especially in the area of producers' prices and prices of internationally traded goods and services, which are the prices most relevant to the data items comprising the difference between GSP and SFD. There is an assumption underlying the approach adopted in deriving the aggregate State deflators, namely that price competition will ensure that the available price indicators are reasonably indicative of the changes at the State level. This is a less distorting assumption if the price indicators are weighted together at a reasonable level of commodity disaggregation, and implies deriving current and chain volume estimates at as fine a level of detail as possible. The indicators used in generating the State component splits are necessarily partial, which leads to the need for caution about the accuracy of the derived GSP deflators. A description follows of the available data sources in respect of each of the component categories and the way in which they are used.

Changes in inventories

28.73 There is no available State dimension to the existing quarterly survey estimates for inventories. Available information on inventory holding, production or sales has been used to give a State allocation of the national totals, in current price and volume terms, for a number of sectors for which price variation in the component commodities is considered likely to have a significant impact on the individual aggregate State deflators or for which indicator data are readily available.

28.74 In the case of private non-farm inventories:

- *Mining*—annual estimates of inventory levels, by State, are available from mining census data for each of the two categories: non-metallic minerals and metallic minerals (see *Australian Mining Industry* (Cat. no. 8414.0)). These are used to split inventories estimates from the quarterly survey of inventories onto a State basis;
- *Manufacturing*—annual factor cost estimates of manufacturing production, by State, based on manufacturing survey data (see *Manufacturing Industry, Australia* (Cat. no. 8221.0)) are used to produce State splits of the national estimates of the changes in inventories;
- *Retail trade*—quarterly estimates of retail turnover, by State, based on estimates from the monthly retail turnover survey, are used to allocate, by State, estimates of the changes in inventories; and
- *Wholesale trade*—a fixed relationship between States has been derived from wholesale turnover estimates from the 1991–92 survey of wholesalers (see *Wholesale Industry: Details of Operations* (Cat. no. 8638.0)). This fixed relationship is used to allocate, by State, changes in wholesalers' inventories. For those marketing authorities privatised in July 1999, changes in inventories are allocated to the States using indicators such as production or export data.

Changes in inventories continued

28.75 In the case of farm and public authorities inventories, changes in inventories are allocated to the States using annual indicators such as production or exports data.

International trade in services

28.76 Activity indicators are used to derive State contributions to the national current price and chain volume estimates of exports and imports of services. Since there are no available indicators of variations in the component deflators between States, the same splits have been applied in current and volume terms:

- *Transport—*
  Exports: allocated using merchandise exports, recorded trade State data;
  Imports: allocated using merchandise imports, recorded trade State data.
- *Travel and Government services—*
  Exports: allocated using State estimates of expenditure on travel services by non-residents in Australia (these data are used in the derivation of household final consumption expenditure);
  Imports: allocated using State estimates of expenditure on travel services by Australians overseas (these data are used in the derivation of household final consumption expenditure).
- *Insurance services, Freight—*
  Exports: allocated using merchandise exports, recorded trade State data;
  Imports: allocated using merchandise imports, recorded trade State data.
- *Other, balance of above—*
  Exports: allocated using estimates of State final demand;
  Imports: allocated using estimates of State final demand.

Interstate trade in goods

28.77 Interstate exports and imports of goods pose a particular problem. These data items are different from those above in that the flows must net to zero at the national level, and hence there are no equivalent current price estimates at the national level which can be split and no relevant price indicators derived in relation to these items at the national level. The strategy adopted is to generate volume estimates, derive price indexes relevant to these flows, and then inflate the volume estimates to yield current price estimates.

Interstate trade in goods continued

28.78 For those States for which survey data by commodity on the value of interstate imports and exports of goods are available (Western Australia (annual up to 1991–92) and Queensland (quarterly)), the data are deflated to obtain volume estimates. For the remaining States, and for Western Australia from 1992–93, indicators of interstate exports and imports are derived using broad (chain volume) activity indicators to extrapolate interstate trade flow estimates which have been derived using estimates from a model produced by the Monash University Centre of Policy Studies, as described in *Notes on the Construction of the 1986–87 Input-Output Database for the MONASH-MR Model* by G.A. Meagher. The model yields estimates of interstate trade in goods by industry and State of supply and by State of destination. The relationships between the estimates by State and by industry are assumed to be fixed over time. The Monash model data used at present are in respect of 1986–87. The model identifies interstate trade flows only with respect to three industries: agriculture, mining and manufacturing. An internationally sourced component of interstate exports and imports is also incorporated. This component is not derived directly from the Monash data, but by comparison of the Monash net interstate trade estimates and the net interstate trade balances after identifying all other items, by State, in 1986–87.

28.79 The export and import flow data from the model are used to weight together price indexes for the three industries to form an interstate import price index and an interstate export price index for each State. The industry price indexes are derived separately for each State. They are fixed weighted indexes for agriculture and chain Paasche indexes for mining and manufacturing, on the basis of production or turnover estimates for the three industries. Thus the price indexes are fixed weighted between industries and between supplying States on the basis of the composition of interstate trade in 1986–87 as identified in the Monash model, but variably weighted within the mining and manufacturing industries.

28.80 State by industry deflators have been derived by the following means:

- *Agriculture, etc.*—Australian Bureau of Agricultural and Resource Economics (ABARE) indexes of prices received by farmers, by State, have been used for this industry (see the ABARE quarterly publication *Indexes of Prices Received and Paid by Farmers*). These price indexes are fixed-weighted. It would be possible to produce chain Paasche indexes using component commodity prices and production details by commodity, given the relative importance of the flows in this sector and the possibly low correlation between the composition of production and the composition of the interstate trade component. However, this additional degree of complexity has not been pursued.

Interstate trade in goods continued

- *Mining*—State chain Paasche price indexes are compiled by weighting together price indicators for a variety of mineral commodities using monthly mineral production data. Both the price and quantity estimates are consistent with those published in the quarterly ABARE publication *Quarterly Mineral Statistics*.
- *Manufacturing*—State chain Paasche price indexes are derived using turnover data from the annual manufacturing census as weights, and producer price indexes. These annual price indexes are extrapolated, when necessary, using Paasche price indexes derived using production indicators from the monthly ABS surveys of manufacturing production and ABARE production data to weight relevant component producer price indexes.

28.81 The deflators for the internationally sourced component of interstate trade reflect the fact that only estimates of the net flows are made for this component. A chain Paasche price index of international imports into New South Wales and Victoria, the net exporter States, is used for revaluation of flows into the net importer States, and the respective aggregate State international import deflators are used for flows out of New South Wales and Victoria. Current price estimates of interstate exports and imports flows are derived by inflating the extrapolated volume estimates using the deflators derived as described above.

Interstate trade in services

28.82 Interstate trade in services, which is not accounted for in the model used for goods, is likely to be significant in the case of at least some of the States, with the Australian Capital Territory likely to be particularly affected. State estimates of household final consumption expenditure include an adjustment to account for net expenditures interstate on services by households. This item is added to household final consumption expenditure to adjust it from a territorial to a resident basis. In order to ensure consistency of treatment, the current and volume estimates of household expenditures interstate are included here, but with the opposite sign. It has not been possible to include estimates for the net expenditures interstate on services by the business and government sectors. The net effect of making only partial allowance for the interstate flow of services is that the weighted average deflator derived for the identified components of GSP, including SFD, will be attributed to the balance of this item.

Qualifications attaching to chain volume GSP estimates

28.83 The incomplete nature of the price and expenditure data available at the State level for the derivation of the GSP deflators, and the generally lower level of accuracy of State data, referred to earlier, mean that there is a greater scope for inaccuracy than in comparable estimates at the Australian level. The chain volume measures of GSP are derived measures, calculated by adjusting the current price estimates using specially constructed State deflators. This means that the chain volume measures incorporate the combined effects of the inaccuracies in the current price estimates and those in the deflators. These inaccuracies reflect a number of factors, including: higher relative sampling errors;

Qualifications attaching to chain volume GSP estimates continued

the 'fuzziness' of some State data arising from difficulties that businesses and government agencies operating across the country have in allocating their activities by State; and the limited availability of source data on a State basis in a number of areas. The inaccuracies in the component value and price estimates may be compounded or offset in the process of deriving the chain volume measures.

28.84 In analysing the chain volume measures it is important to recognise the data limitations at the State level and to be aware that the accuracy of the estimates will not be as high as that of the corresponding national estimates.

CHAPTER 29 QUALITY OF THE NATIONAL ACCOUNTS

THE CONCEPT OF QUALITY

29.1 Given the importance of the national accounts for economic policy formulation and for monitoring the impact of economic policy, it is important that they are of a high quality. The quality of a particular statistic is determined by its 'fitness' for whatever purposes users have for the statistics. As different users use national accounts statistics for different purposes, views on what aspects of quality are most important will vary from user to user. Nonetheless, there are a number of aspects of quality that are relevant in most circumstances. These are:

- accuracy
- the extent of revisions
- timeliness
- relevance
- accessibility
- comparability with other statistics

29.2 This chapter describes each of these 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.

29.3 In understanding quality, it is also important to recognise that there are often trade-offs across the aspects of quality. For example, statistics that are very timely are often less accurate than those that are less timely. To overcome this, a sequence of estimates for a particular period of time may be released, with each estimate considered to be more accurate than the one that preceded it. However, the disturbance in estimates that this induces affects the reliability of the statistics. Trade-offs can also occur between accuracy and relevance. It may be more difficult to measure exactly what users require than something that approximates their requirements. It is also important to recognise that, in general, the higher the quality that an estimate is, the more costly it is to compile it. This is particularly so for the accuracy aspect of quality. Nonetheless, with improvements in technology and other aspects of the compilation process it may be possible to improve the quality of statistics without increasing costs. Another important issue that must be considered in assessing quality is the complexity of what is being measured. As complexity increases, as has been the case with the Australian economy, it becomes more difficult to maintain quality, all other things being equal. Again, improvements in the compilation process can have a mitigating impact on this.

29.4 In compiling the national accounts the ABS is mindful of all of these issues. The ABS maintains regular contact with key users and their views on what aspects of quality are most important to determine how the quality trade-offs are dealt with. User views on quality are also given prominence in developing work programs for improving the quality of the national accounts.

ACCURACY

29.5 Accuracy can be defined as the proximity of an estimate to its notional true value. The true value is considered notional because, in practice, most statistics cannot be measured with perfect accuracy. Also, as this true value is generally unknown, it is generally impossible to quantify exactly how far an estimate deviates from its true value. Nonetheless, 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. 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.

29.6 The accuracy of statistics is influenced by a number of factors, including:

- data collection errors, which include errors due to the inability of data providers to report on the correct basis, mistakes in the reporting of data, errors due to non-response, and errors introduced during the processing of data;
- methodological errors, which include errors resulting from shortcomings in data sources and estimation methods;
- errors in the coverage of source data collections; and
- errors attributable to the use of sample surveys, rather than complete enumerations.

29.7 The national accounts are compiled within a comprehensive framework, and so it is possible to reduce the impact of these 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.

Data collection errors

29.8 The most likely source of data collection error, from a national accounts perspective, would result from the inability of 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. Sophisticated techniques are used to edit provider responses but not all errors will be recognised and rectified. If patterns of misreporting are identified, steps will be taken to reduce the incidence of misreporting, either by specifically drawing to the attention of data providers what should be included or excluded, or by changing the reporting requirements to better align with business accounting practices. The problem with the latter approach, though, is that some adjustment will be needed to reported data to place it on the correct basis for national accounts compilation. This adjustment process is another source of error for the national accounts estimates themselves.

29.9 As well as inappropriate inclusions and exclusions, data providers can make errors with regard to the timing and valuation of their transactions. Because the national accounts is a closed system, such errors can lead to inconsistencies, affecting the coherency of the accounts. For example, if the import of a capital good, valued at $150 million, was recorded in one quarter and the related capital formation (assuming that the good never entered inventories) was recorded in the subsequent quarter, then the expenditure measure of GDP will be too low by $150 million in the first quarter and too high by the same amount in the next quarter. This, in turn, will cause errors to growth rates for three quarters, the two quarters affected by the misreporting and the following quarter, with the greatest error occurring in growth rates for the middle quarter.

29.10 Another significant data collection problem concerns income tax data from the ATO, which is used to derive annual estimates for aggregates such as gross operating surplus and gross mixed income. It is likely that some businesses under-report their income or over-report their expenses to the ATO in order to avoid income tax. It is difficult to quantify the extent of this misreporting. However, estimates for it are made based on a variety of sources, including ATO business audit information, confrontation with other data and anecdotal evidence.

Methodological errors

29.11 Statistical collections have a cost both to the organisation undertaking the collection and the respondents. The more frequent the collection, the greater the number of respondents or the greater the number of questions then the greater is the cost to both the statistical organisation and respondents. It is therefore necessary to adopt a strategy that makes the best possible use of data available from administrative and other sources and that structures statistical collections around these data such that they maximise the benefits for a given cost. This inevitably means that for many areas of economic activity accurate and detailed data are only available annually or less frequently. In these cases, annual or less-frequent benchmarks are established, with more frequent estimates derived using extrapolation and interpolation techniques. For the most part, indicator series are used for this purpose. The indicators vary in the closeness of their relationship to the concept being measured. For example, annual benchmark estimates of private gross fixed capital formation on machinery and equipment, which are derived from the annual Economy Activity Survey and taxation statistics from 1994–95 (and exclusively from taxation statistics for years prior to 1994–95), are projected using indicators from the quarterly Survey of Private New Capital Expenditure. These indicators are considered to be very good for this purpose, although they do have their deficiencies, such as the lack of coverage of non-employing businesses. In the case of the quarterly chain volume estimates of gross value added by industry, with the exception of agriculture, the quarterly indicators are either output or input measures rather than value added itself. In the short term, output measures are likely to be reasonable indicators of changes in value added in volume terms, but input measures preclude changes in productivity. The quarterly estimates for non-farm gross mixed income are not very satisfactory, as they are derived using broad activity indicators such as retail turnover and capital formation on dwellings. For some relatively minor series where no suitable quarterly information is available, annual estimates are extrapolated and interpolated using mathematical techniques.

29.12 Methodological errors can also affect the compilation of chain volume measures. For the most part, the price indexes that are used for this purpose are very appropriate. However, chain volume measures for some aggregates are compiled using proxy price indexes in the absence of price indexes directly pertaining to the aggregates. For example, in the absence of an index of purchasers' prices for capital equipment, chain volume estimates for private gross fixed capital formation on machinery and equipment are derived using various elements of the import and articles produced by manufacturing industries price indexes. Errors will be present in the chain volume measures of these aggregates to the extent that movements in the proxy price indexes are different to those that would be observed in the 'correct' price indexes if such indexes were to be compiled.

Errors in coverage

29.13 Most of the ABS data sources used in the compilation of the national accounts are taken from the ABS's business register. As this register generally only contains businesses that employ staff, the estimates from these data sources generally exclude the economic activity of non-employing businesses.

29.14 Therefore, in compiling the national accounts, estimates of the economic activity of non-employing businesses have to be obtained from other sources, of which the most important is data from the Australian Taxation Office. However, such sources are generally only available annually, and quarterly estimates are generally based on indicators that exclude non-employing businesses (there are exceptions, e.g., quarterly estimates of building activity are derived from a survey based on building approvals, and include building activity of both employing and non-employing businesses). If the economic activity associated with non-employing businesses changes at a different rate to that associated with employing businesses then there will be errors in the quarterly estimates. The extent of error for any particular series will depend, in part, on the contribution of non-employing businesses to the economic activity being measured by that series. At one end of the scale, the problem does not affect estimates of compensation of employees as, by definition, non-employing businesses are excluded from the compilation of this item. However, for quarterly estimates of gross mixed income, the problem is significant as a large proportion of unincorporated businesses have no employees.

29.15 More generally, there are lags between businesses being created and their appearance on the ABS business register. The ABS seeks to overcome this problem by using 'new business provisions', which are estimates for the economic activity of businesses that are not yet on the register. The business register is also known to suffer from 'leakage', which occurs when employing businesses are inadvertently removed from the register. Again, estimates are made for the impact of this.

Sample errors

29.16 Many of the data sources used to compile the national accounts, particularly those from the ABS, are based on sample surveys, rather than complete collections. Sample surveys are subject to a particular type of error, known as *sample error*. Unlike most other forms of error, the likelihood of sample error can be quantified using mathematical techniques. The most common measure of sample error is the *relative standard error* (RSE). The true value of any estimate lies within one RSE of the sample estimate about two-thirds of the time, and within two RSEs about nineteen times in twenty. For example, if a sample estimate of $100 million has an RSE of 3%, then there are about two chances in three that the true value lies in the range $97 million to $103 million, and nineteen chances in twenty that it lies in the range $94 million to $106 million.

29.17 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 that are made in order to compile the national accounts, it is generally not possible to calculate the exact impact that RSEs have on the various national accounting aggregates.

Some assessments of the accuracy of quarterly national accounts estimates

29.18 While it is generally not possible to provide exact information on the accuracy of national accounts estimates, intuitive assessments of the accuracy of the estimates can be made, based on knowledge of data sources used. The tables below contain such assessments for the initial quarterly estimates of movement for key components of the accounts. Initial quarterly estimates of movement have been chosen as they are generally the most anticipated of the national accounts estimates. Each component is assigned one of the following grades:

A good
B fair
C poor
D very poor

29.19 As well as providing an indication of the accuracy for particular components, the tables can be used to assess the relative accuracy across the components of the national accounts.

29.20 In using the tables, it should be noted that the assessments of accuracy relate to the time this publication was printed. Estimates for prior or future periods may vary as the quality of data sources, compilation techniques, etc can change over time.

29.21 The following table contains accuracy ratings for the current price income and expenditure components of GDP, and for the chain volume measures of the expenditure components of GDP. The accuracy of the expenditure chain volume measures is generally a function of the accuracy of the current price estimates and the accuracy of the price indexes that are used to deflate the current price estimates.

Some assessments of the accuracy of quarterly national accounts estimates *continued*

29.1 ACCURACY RATINGS—EXPENDITURE AND INCOME COMPONENTS OF GDP—INITIAL QUARTERLY ESTIMATES OF MOVEMENT

	Current price estimates	Chain volume estimates
Expenditure components		
Government final consumption expenditure	B	C
Household final consumption expenditure	A	A
Total final consumption expenditure	A	A
Gross fixed capital formation		
Private		
Dwellings	B	B
Other buildings and structures	B	B
Machinery and equipment	B	B
Livestock	C	C
Intangible fixed assets	C	C
Ownership transfer costs	A	B
Total private gross fixed capital formation	B	B
Public		
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	B	B
Total changes in inventories	C	C
Gross national expenditure	A	A
Exports of goods and services	A	A
Imports of goods and services	A	A
GDP	A	A
Income components		
Compensation of employees	A	na
Gross operating surplus		
Non-financial corporations		
Private	A	na
Public	B	na
Total non-financial corporations	A	na
Financial corporations	C	na
General government	A	na
Dwellings owned by persons	A	na
Total gross operating surplus	A	na
Gross mixed income	C	na
Total factor income	A	na
Taxes less subsidies on production and imports	A	na
GDP	A	na

29.22 The following table contains accuracy ratings for the industry value added chain volume measures. The accuracy of these estimates reflects both the appropriateness of the indicators used and the accuracy of the indicator estimates themselves.

Some assessments of the accuracy of quarterly national accounts estimates *continued*

29.2 ACCURACY RATINGS—INDUSTRY VALUE ADDED, CHAIN VOLUME MEASURES—INITIAL QUARTERLY ESTIMATES OF MOVEMENT

A	Agriculture, forestry and fishing	B
B	Mining	B
C	Manufacturing	B
D	Electricity, gas and water supply	A
E	Construction	B
F	Wholesale trade	B
G	Retail trade	B
H	Accommodation, cafes and restaurants	B
I	Transport and storage	D
J	Communication services	B
K	Finance and insurance	C
L	Property and business services	C
M	Government administration and defence	C
N	Education	C
O	Health and community services	C
P	Cultural and recreational services	B
Q	Personal and other services	C
..	Ownership of dwellings	A
	Gross value added at basic prices	A
	Taxes less subsidies on products	A
	GDP	A

29.23 More objective, but limited, measures of accuracy are provided by the various statistical discrepancies contained in the national accounts. The table below shows estimates of the average absolute values of the statistical discrepancies in the three estimates of GDP. As explained in Chapter 4, there are three approaches that can be used to measure GDP: the income, expenditure and production approaches. In concept, each approach should deliver the same estimate; however if the measures are compiled independently using different data sources then different estimates will result. In Australia's national accounts, a single quarterly estimate of GDP is obtained by averaging the three measures, and statistical discrepancies are inserted to 'balance' each measure of GDP to the average.

29.3 AVERAGE QUARTERLY STATISTICAL DISCREPANCY(a) AS A PERCENTAGE OF GDP

	Whole series %	Past 10 years %	Past 5 years %
Median	0.5	0.3	0.3
Mean	0.6	0.4	0.3

(a) Calculated as the average of the absolute current price expenditure, income and production statistical discrepancies. The current price production statistical discrepancy is equal to the chain volume production statistical discrepancy multiplied by the expenditure IPD.

29.24 For years in which the national accounts are benchmarked to supply and use tables, there are no annual statistical discrepancies in the estimates of GDP as these are eliminated in the balancing process. However, for these years there are still quarterly statistical discrepancies as the sources and methods used to interpolate the annual benchmarks are generally independent.

Some assessments of the accuracy of quarterly national accounts estimates *continued*

29.25 Statistical discrepancies are also shown in the capital and financial accounts. The former is equal to the difference between the GDP expenditure and income statistical discrepancies. In the financial accounts, a 'net errors and omissions' item is included to reconcile the conceptually identical but in practice divergent estimates of net lending/borrowing and net change in financial position.

29.26 Small or zero statistical discrepancies do not necessarily mean that the aggregates to which they relate are of higher quality than those subject to larger statistical discrepancies. It is possible that there may be offsetting errors, or, in the case of the GDP statistical discrepancies, similar magnitudes of overstatement/understatement in each measure of GDP. It is for these reasons that statistical discrepancies, while they are useful indicators of quality, need to be interpreted with caution.

REVISIONS

29.27 Economic analysts and policy makers not only require accurate and timely information on the movements in and magnitude of the principal national accounts aggregates, but they must also have confidence that these indicators are unlikely to change significantly as more complete data become available.

29.28 The extent to which statistics are subject to revision is one of the more easily quantifiable aspects of quality. However, these measures do not provide an unambiguous guide to quality. A series may be subject to few revisions, but the series may be highly inaccurate due to poor data sources. 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. On the other hand, it may be possible to compile timely statistics that are not subject to revision only by placing an unacceptable load on survey respondents or at great cost to the compiler.

29.29 An analysis of revisions can, however, identify the possibility of inaccurate initial data or inefficient compilation methods. If it can be established that revisions are significantly *biased* (i.e. consistently positive or negative) then it is self-evident that initial estimates are inaccurate. The information on revisions can then be used to improve compilation methods to remove systematic distortions arising from the estimation process.

29.30 However, even if there are no systematic distortions in compilation processes, users may still consider certain statistics to be unreliable because the revisions are significantly *dispersed* (i.e. the mean absolute values of the revisions are large). Generally, it is only possible to deal with such problems by improving the quality of source data by, for example, increasing initial survey response rates.

29.31 Revisions are a natural consequence of the processes used to compile the national accounts. Initial quarterly estimates are based on survey responses received and processed before a particular cut-off time. Following the cut-off, imputations are made for the non-respondents based on the responses of similar businesses and the responses of the non-respondents in the previous quarter. Subsequently, when the non-respondents finally respond the imputations are replaced and revisions to the estimates result. For many aggregates, quarterly estimates are compiled by applying indicators to annual (or less frequent) benchmarks based on superior data sources. This benchmarking process typically leads to revisions over an extended period of time. Often the first benchmark data to become available are preliminary estimates and are therefore themselves subject to revisions. For the most part, benchmarks are considered 'final' three years after the period to which they relate has passed.

29.32 Another source of revisions is the availability of a major new data source or the development of an improved estimation methodology. Sometimes, the resultant revisions may even effect estimates for periods prior to those for which the benchmark estimates would have otherwise been considered 'final'.

29.33 Seasonally adjusted and trend estimates will usually experience some degree of revision over several years, due to the prolonged period required to finalise the estimation of seasonal adjustment factors.

29.34 The ABS has a comprehensive revisions policy for its national accounts statistics. A copy of this policy is available on request.

29.35 The table below shows the extent to which revisions have affected estimates of the percentage change in quarterly seasonally adjusted GDP (chain volume measure) for recent years. Two measures of revisability are shown, the mean absolute revision and the mean revision. The former is a measure of dispersion and the latter is a measure of bias.

29.4 REVISIONS TO QUARTERLY GDP, PERCENTAGE CHANGE(a)

	Difference between first estimate and estimate one year later		*Difference between first estimate and estimate published in MQ 2000 issue of 5206.0*	
	Mean absolute revision % pts	Mean revision % pts	Mean absolute revision % pts	Mean revision % pts
1992–93	0.2	0.2	0.6	0.3
1993–94	0.4	-0.1	0.2	-0.1
1994–95	0.4	—	0.4	0.2
1995–96	0.1	—	0.2	—
1996–97	0.4	—	0.4	0.3
1997–98	0.5	-0.2	0.4	0.1
Average	0.3	—	0.4	0.1

(a) Seasonally adjusted chain volume measure

REVISIONS *continued*

29.36 For a comprehensive analysis of national accounts revisions, see the article "Revisions to Quarterly Economic Growth Rates 1984 to 1993", published in the July 1998 issue of *Australian Economic Indicators* (Cat. no. 1350.0).

TIMELINESS

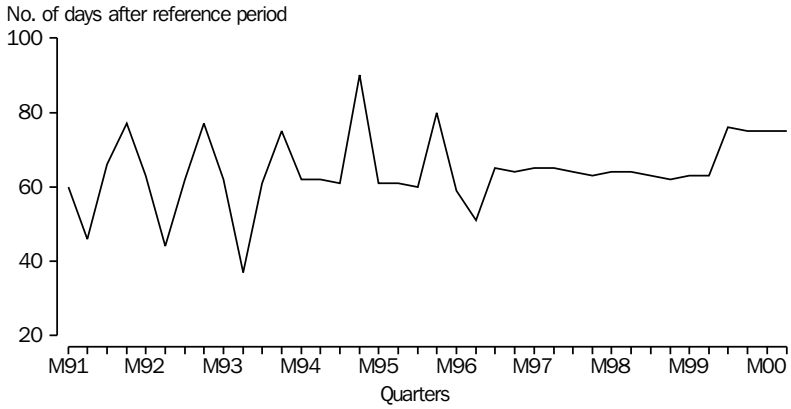
29.37 Timeliness refers to the lag between the end of a reference period and the publication of statistics for that period. There is an important trade-off between accuracy and detail on the one hand and timeliness of the release of statistics on the other. The source data that are used to compile the national accounts are available with varying degrees of timeliness, frequency, accuracy and detail. The data sources providing more detailed and accurate (from a national accounts perspective) data tend to be those that are less frequent and/or less timely. Because of this, within a given level of resources, improvements in timeliness can generally only be made at the expense of accuracy and detail. Different users react to this trade-off in different ways. A user interested in undertaking in-depth, long-term, analysis may prefer detailed statistics that are only availably annually. On the other hand, a user interested in understanding current economic conditions may prefer very timely and frequent estimates that are less detailed.

29.38 The trade-off between timeliness, and accuracy and detail, is accommodated by way of the sequence of releases of national accounts publications. The first published quarterly estimates are usually made available about 65 days after the reference period, although this can vary due to transient issues associated with the timeliness of source data. Historically, the detailed annual estimates were released about 350 days after the reference period, but commencing with the 1998–99 issue the timeliness of the annual national accounts publication (Cat. no. 5204.0) has been improved substantially to about 150 days. The most detailed national accounts estimates are those contained in the input-output tables, which typically become available about 3.5 years after the reference period.

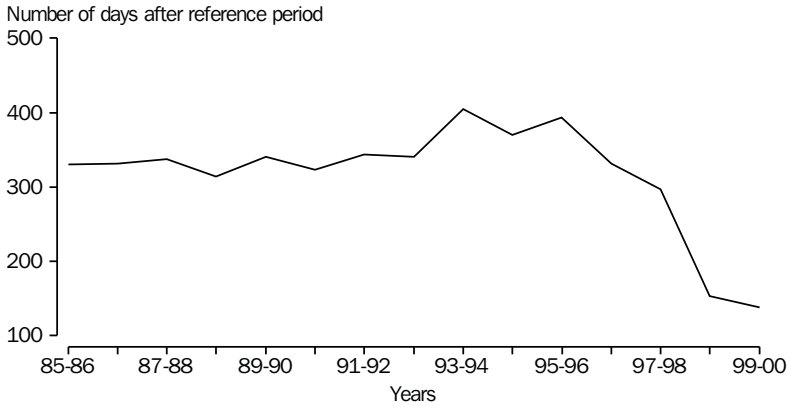
29.39 The graphs below show the timeliness of the release of the two main national accounts publications: the quarterly publication 5206.0 and the annual publication 5204.0. The recent deterioration in the timeliness of 5206.0 is temporary and is primarily associated with lags in the receipt of government finance data due to the introduction of accrual accounting by the Commonwealth Government. The early releases of June quarter issues of 5206.0 evident in the early part of the 1990's were associated with August Federal Budgets and the need to release national accounts in conjunction with the Budget estimates. The estimates contained in these releases were of a somewhat poorer quality than those normally provided in the quarterly publication. The aforementioned improvement in the timeliness of the 1998–99 issue of 5204.0 is evident from the timeliness graph for this publication.

TIMELINESS *continued*

29.5 TIMELINESS OF RELEASE OF QUARTERLY NATIONAL ACCOUNTS PUBLICATION



29.6 TIMELINESS OF RELEASE OF ANNUAL NATIONAL ACCOUNTS PUBLICATION



RELEVANCE

29.40 An important aspect of the quality of national accounts statistics is that the concepts, definitions and classifications should be relevant to, and understandable, by users.

29.41 To this end, Australia's national accounts are produced within an integrated statistical framework based on the international statistical standard, SNA93 for national accounts. SNA93 reflects over 50 years of developments in national accounting and it is based on contemporary economic theory. It was developed on the basis of the needs of key users involved in macroeconomic analysis and policy formulation. To ensure that Australia's national accounts are 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 Australia's national accounts remain comparable to those of other countries.

29.42 Furthermore, the SNA93 is subject to continuous review to ensure that it is able to accommodate contemporary economic and financial developments. These reviews may occasionally lead to changes in the framework.

RELEVANCE *continued*

29.43 Publications such as this one assist users to understand the conceptual basis underlying Australia's national accounts. In addition, the ABS provides a range of conceptual and methodological information in all of its national accounts publications. Particular focus is placed on explaining contemporary issues affecting the national accounts. Recent articles on Y2K computer expenditure, the Sydney Olympics and the GST provided in 5206.0 are examples of this. Significant changes to the statistics are generally preceded by consultation with users and the publication of Information Papers describing the changes.

ACCESSIBILITY

29.44 It is important that statistics are accessible to those who need to use them. A highly accurate, relevant and timely set of statistics is useless to someone who cannot obtain them.

29.45 In order to make its national accounts statistics accessible, the ABS releases them in a number of formats. The most well-known is the traditional paper publication, which are available by mail and 'over the counter' in each capital city. Copies of the key national accounts publications are provided to public libraries around Australia for access by the general public. The paper publications are supplemented by a variety of electronic releases, including Ausstats and tailored time-series releases. The main features section of each national accounts publication is available on the ABS's Website. The ABS also makes its national accounts statistics available to secondary providers for inclusion in their products. National accounts statistics are also provided to the media, who in turn provide extensive coverage of the statistics. 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.

29.46 An important aspect of accessibility is knowing when statistics are released and because of this release dates of national accounts publications are announced well in advance, both in national accounts publications and in general ABS release advices.

29.47 Another notable hallmark of accessibility is that statistics are made available to all users simultaneously. The ABS places great importance in ensuring that this occurs, by placing an embargo on the release of statistics until 11:30am (Canberra time) on the designated day of release. There are strict security measures to ensure that there is no unauthorised access of statistics prior to their release.

COMPARABILITY WITH OTHER STATISTICS

29.48 Users interested in understanding economic developments rarely rely solely on the national accounts. They supplement the information contained within the accounts with information from other ABS sources and from non-ABS sources. Therefore, it is important that the national accounts be as comparable with these other statistics as possible.

29.49 For the most part, SNA93 (in conjunction with related international standards such as the IMF's *Balance of Payments Manual*) is used as the over-arching framework for all ABS economic statistics, not just the national accounts. The use of this common framework obviously helps to achieve comparability between the national accounts and other ABS economic statistics. In addition, the ABS has a range of standard economic classifications including those for institutional sector, industry and commodity (product). These classifications are used in the national accounts and in other ABS statistics and, occasionally, in non-ABS statistics (for information on the use of these classifications in the national accounts see Appendix 1 of this publication).

29.50 Another way in which the comparability of the national accounts with other ABS statistics is achieved is through the use of a common statistical units model. Statistics (particularly those pertaining to industry) from two sources are more comparable when both sources use the same statistical unit. However, for a number of reasons it is not always possible to use the same statistical unit in all collections and thus the ABS's units model provides for a number of different, but relatable, types of statistical units (issues associated with statistical units are discussed in Chapters 5 and 6 of this publication). Statistical comparability is also enhanced when the populations for statistical collections are obtained from a common source; the ABS's Business Register is such a source for the ABS's economic collections.

29.51 From the foregoing, it is clear that the ABS's national accounts are likely to be more compatible with other ABS statistics than with non-ABS statistics. Accordingly, users should exercise care when comparing the national accounts with non-ABS statistics and be aware of any conceptual or methodological differences that may impact upon comparability.

LIST OF ABBREVIATIONS

AARF	Australian Accounting Research Foundation
ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
ACS	Australian Customs Service
AAE	average age-efficiency (function)
AFS	Agricultural Finance Survey
ANA	Australian national accounts
ANZSIC	Australian and New Zealand Standard Industrial Classification (1993 edition)
ARIA	Australian Recording Industry Association
ASNA	Australian System of National Accounts
ASX	Australian Stock Exchange
BEA	US Bureau of Economic Analysis
BEC	(Classification by) Broad Economic Categories
BOY	beginning of year
BLS	US Bureau of Labor Statistics
BPM5	Balance of Payments Manual 1993 (fifth edition) (International Monetary Fund)
CBAs	Central Borrowing Authorities
CBCS	Commonwealth Bureau of Census and Statistics
c.i.f.	cost, insurance and freight
COE	compensation of employees
COFC	consumption of fixed capital
COICOP	Classification of Individual Consumption by Purpose
COPNI	Classification of the Purposes of Non-Profit Institutions Serving Households
CPI	Consumer Price Index
DETYA	Commonwealth Department of Education, Training and Youth Affairs
DISR	Commonwealth Department of Industry, Science and Resources
EAS	Economic Activity Survey
EASTAX	combined EAS and income tax data
EDR	economic demonstrated resources
EOY	end of year
EPI	Export Price Index
Eurostat	statistical arm of the Commission of the European Communities
FIFO	first in first out
FISIM	financial intermediation services indirectly measured
f.o.b.	free on board
GDP	Gross Domestic Product
GDP(E)	expenditure approach to measuring GDP
GDP(I)	income approach to measuring GDP
GDP(P)	production approach to measuring GDP
GFCE	government final consumption expenditure
GFCF	gross fixed capital formation

LIST OF ABBREVIATIONS *continued*

GFS	Government Finance Statistics (ABS) (whether this and the next entry applies would be clear from the context)
GFS	Manual of Government Finance Statistics (second edition) (International Monetary Fund)
GMI	gross mixed income
GNI	gross national income
GOS	gross operating surplus
GOSMI	GOS (excluding GOS for general government) plus GMI
GSP	gross state product
GSP(E)	expenditure approach to measuring GSP
GSP(I)	income approach to measuring GSP
GST	Goods and Services Tax
HECS	Higher Education Contributions Scheme
HES	Household Expenditure Survey
HFCE	household final consumption expenditure
IMF	International Monetary Fund
I-O	Input-Output
IOIC	Input-Output Industry Classification
IOPC	Input-Output Product Classification
IPD	implicit price deflator
IPI	Import Price Index
ISIC (Rev. 3)	International Standard Industrial Classification of All Economic Activities, Revision 3 (United Nations)
IT&T	information technology and telecommunications (industries)
ITS	international trade statistics
IVA	inventory valuation adjustment
IVS	International Visitor Survey
LFS	Labour Force Survey
LIFO	last in first out
LPG	liquefied petroleum gas
MFP	multifactor productivity
MMFS	Manual of Monetary and Financial Statistics (IMF)
NPIs	non-profit institutions
NPISH	non-profit institutions serving households
NPV	net present value
OECD	Organisation for Economic Co-operation and Development
PHIAC	Private Health Insurance Administration Council
PPS	prescribed payments system
PVA	production valuation adjustment
RAS	residual allocation system
RBA	Reserve Bank of Australia
SDRs	Special Drawing Rights
SEASABS	SEASonal analysis to ABS standards
SEE	Survey of Employment and Earnings
SESCA	Standard Economic Sector Classifications of Australia

LIST OF ABBREVIATIONS *continued*

SFD	state final demand
SFI	Survey of Financial Information
SII	Survey of International Investment
SISCA	Standard Institutional Sector Classification of Australia
SISS	Survey of Inventories, Sales and Services
SITC Rev3	Standard International Trade Classification, Revision 3
SITS	Survey of International Trade in Services
SNA	System of National Accounts
SNA68	System of National Accounts (1968 edition)
SNA93	System of National Accounts (1993 edition)
SOCOG	Sydney Organising Committee for the Olympic Games
SPNCE	Survey of Private New Capital Expenditure
S-U	supply and use (tables)
TNTS	The New Tax System
VAT	value added taxes
WST	wholesale sales taxes
UN	United Nations

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 1993* (SNA93) 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 CLASSIFICATION

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 SNA93 institutional sector classification. The ASNA bases its sector classification on the international standards set out in SNA93. In the ASNA there are five sectors:

- non-financial corporations (including public non-financial corporations);
- financial corporations;
- households (including unincorporated enterprises);
- general government; and
- rest of the world

SNA93 delineates an extra sector for *non-profit institutions serving households* (NPISH), but these units are included with the household sector in the ASNA.

A1.5 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.

A1.6 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.

A1.7 *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.

A1.8 *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.

A1.9 *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* comprises 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.

A1.10 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.

A1.11 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. Non-resident units are therefore excluded from all other sectors.

A1.12 Further information on the classification of institutional sectors generally in ABS statistics is contained in *Standard Economic Sector Classifications of Australia, 1998* (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

A1.13 The SNA93 proposes 'functional' classifications to identify the 'functions'—in the sense of 'purposes' or 'objectives'—for which groups of transactors engage in certain transactions.

A1.14 Four functional classifications are included in SNA93. Of these, two are presently used in the ASNA:

- Classification of Individual Consumption by Purpose (COICOP); and
- Classification of the Functions of Government (COFOG).

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).

A1.15 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.

A1.16 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 and household equipment;
- health;
- transport;
- communications;
- recreation and culture;
- education services;
- hotels, cafes and restaurants; and
- miscellaneous goods and services.

A1.17 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.

FUNCTIONAL CLASSIFICATION *continued*

A1.18 COFOG is the classification proposed by SNA93 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.

A1.19 *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 Australian national accounts the classification of GFCE is aligned with COFOG. The categories used in the ASNA classification of total outlays are as follows:

- general public services;
- defence;
- public order and safety;
- education;
- health;
- social security and welfare;
- economic services; and
- all other.

A1.20 Economic services contains the COFOG classifications of fuel and energy; agriculture, forestry, fishing and hunting; mining and mineral resources; transportation and communication; and other economic affairs and services. The COFOG classifications of housing and community amenity; recreational, cultural and religious; and expenditures not classified by major group, are classified to the 'All other' group.

A1.21 Chapter XVIII *Functional classifications* in SNA93 describes in greater detail the principles and uses of these classifications. Even further detail is contained in *Functional Classifications of the 1993 SNA, COICOP, COPNI, COFOG,* OECD, Paris, 1998.

INDUSTRY CLASSIFICATION

A1.22 The industry classification employed throughout the ASNA is based on the *Australian and New Zealand Standard Industrial Classification, 1993* (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.

A1.23 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.

INDUSTRY CLASSIFICATION
continued

A1.24 In the national accounts ANZSIC, is employed with one modification:, 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.

A1.25 The industry classification used for input-output tables—*Input-Output Industrial Classification* (IOIC)—is also based on ANZSIC, but in some respects it departs from the usual application of that classification. For input-output 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 establishments 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. The major redefinitions made for the input-output framework can be found in *Input-Output Tables, 1994–95* (ABS Cat. no. 5209.0).

PRODUCT CLASSIFICATION

A1.26 The product classification employed in the ASNA is the *Input-Output Product Classification* (IOPC). The input-output system describes the production and subsequent use of all goods and services in the economy, hence the input-output product classification is defined in terms of the characteristic products of industry sectors.

A1.27 The structure of the IOPC arises from its 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 IOPC consists of industry of origin headings with detailed product items shown under each heading.

A1.28 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 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.

PRODUCT CLASSIFICATION
continued

A1.29 This structure is implemented in the IOPC by the adoption of ANZSIC classes as the basis for defining IOPC items. In the 1994–95 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.

A1.30 At its most detailed level the IOPC comprises approximately 1,000 individual product items. For a full description of the nature, purpose and principles underlying this classification see *Input-Output Tables Product Details, 1994–95* (ABS Cat. no. 5215.0).

ASSET CLASSIFICATION

A1.31 SNA93 describes three types of assets that should be included in the national accounts:

- Non-financial produced assets;
- Non-financial non-produced assets; and
- Financial assets (and liabilities).

A1.32 *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 SNA93. Produced assets need not be tangible, or in other words, 'goods'. SNA93 classifies mineral exploration expenditure, computer software and the value of produced entertainment, literary or artistic originals also under the heading of produced assets. Such assets are defined as intangible assets.

A1.33 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:

- 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 intangible assets such as software or artistic originals used in production.

ASSET CLASSIFICATION
continued

- Inventories consist of:
  - stocks of outputs that are still held 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.

Inventories are held either as finished goods, work-in-progress or raw materials.

A1.34 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 'intangibles' such as transferable contracts and purchased goodwill. At present, there are insufficient data to include estimates of water, purchased goodwill and transferable contracts in intangible non-produced assets in the ASNA.

A1.35 *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 a couple of exceptions) a counterpart liability on the part of another institutional unit. Financial assets include monetary gold; special drawing rights on the International Monetary Fund; cash and deposits; securities other than shares; loans and placements; shares and other equity; and other accounts receivable/payable.

A1.36 Chapter X *The capital account* in SNA93 describes in greater detail the classification of assets and liabilities in the national accounts.

APPENDIX 2 DIFFERENCES BETWEEN ASNA AND SNA93

INTRODUCTION

A2.1 As mentioned previously, the ABS endorses the revised SNA and has implemented its recommendations to the fullest extent practicable, especially in relation to those changes which affect GDP. However, there are a number of SNA93 recommendations relating to concepts and the production boundary 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.

SUPERANNUATION CONTRIBUTIONS AND RECEIPTS IN THE HOUSEHOLD INCOME ACCOUNT

A2.2 At present in the ASNA, employers' contributions to superannuation funds (a component of compensation of employees), and interest received on householders' equity in life insurance and superannuation 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.

A2.3 SNA93 continues this conceptual treatment in so far as it affects household saving. However, in contrast to ASNA practice, SNA93 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. The SNA93 treatment therefore 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 a new item 'Adjustment for change in net equity of households on life insurance and pension funds' so as to leave household saving unaffected. The ABS will not be implementing this SNA93 recommendation in the ASNA, because it is considered to be too confusing for users of the accounts.

SPECULATIVE CONSTRUCTION—TIMING OF RECORDING IN GROSS FIXED CAPITAL FORMATION

A2.4 SNA93 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.

A2.5 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 SNA93. It would be difficult to collect the data needed to implement the SNA93 treatment in the ABS Building Activity Survey, 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 SNA93 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 SNA93 recommendation during the user consultations which were conducted prior to the implementation of SNA93 in the ASNA.

CROPS—TIME OF RECORDING IN OUTPUT AND GDP

A2.6 SNA93 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 crustacea, vineyards, orchards and timber tracts. In SNA68, 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 SNA93 recommendations for major categories of livestock (i.e. beef and dairy cattle and sheep).

A2.7 The recommendations for crops and plantation growth will not be implemented for data availability and operational reasons. Implementation of the SNA93 treatment for crops would require crop output to be forecast at the beginning of the crop year and then distributed to quarters as production 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 and variations in prices for agricultural commodities, revisions to the previous year could be substantial if the SNA93 approach

CROPS—TIME OF RECORDING IN OUTPUT AND GDP *continued*

were to be adopted. The existing methodology for the seasonal adjustment of crop production also requires crops to be forecast, but this does not have to be done until November, towards the end of the crop year, when there is substantially more information available on the likely outcome of the harvest. A further difficulty is that measurement of the crop production process throughout the season would be quite arbitrary. Allocation of output using costs incurred in each period, including an allowance for the use of own labour, is recommended by SNA93. 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.

A2.8 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) and to wheat marketing costs in both current price and volume terms.

ORCHARD GROWTH—INCLUSION WITHIN THE FIXED ASSET BOUNDARY

A2.9 SNA93 recommends that the value of acquisitions less disposals of mature repeat production trees, vines, shrubs, etc., and the acquisition and establishment of immature trees etc. on own account, should be included in gross fixed capital formation. The latter may be valued by the costs incurred in their establishment during the period until maturity. In the existing ASNA, these establishment costs are variously treated as intermediate consumption or gross fixed capital formation, depending on their treatment in business accounts. Although the ABS supports the SNA93 recommendation in principle, it has not been implemented for data availability reasons.

VALUABLES—INCLUSION WITHIN THE FIXED ASSET BOUNDARY

A2.10 A new type of asset has been created in SNA93 called '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 is 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 SNA93 recommendation is supported in principle, existing and prospective data availability is a major problem. It has not been possible to implement this change 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'.

INCLUSION OF REAL ESTATE OWNERSHIP TRANSFER COSTS IN THE VALUATION OF ASSETS

A2.11 SNA93 recommends that the purchaser's transfer costs (stamp duties, legal fees etc.) should be added to the purchase price when measuring the acquisition of fixed assets, and that the seller's transfer costs (real estate agents' commissions, legal fees etc.) should be deducted from the sale price when measuring disposals. The effect of this is to include the whole of the costs of ownership transfer in gross fixed capital formation. In SNA93, ownership transfer costs (except for those on land) are included indistinguishably with the asset being bought and sold, rather than being shown as a separate asset class. As such, they are written off over the lives of the underlying assets.

A2.12 The SNA93 treatment of ownership transfer costs is currently under review internationally. It is the ABS's intention to adopt whatever treatment is agreed upon as a result of this review. In the interim, in the ASNA, ownership transfer costs are included in gross fixed capital formation, but they are shown as a separate asset rather than as part of gross fixed capital formation in the underlying assets. This is in line with longstanding practice in the Australian national accounts. However, because of this treatment, difficulties arise in the context of the balance sheet. As ownership transfer costs do not exist as a separate economic asset in the real world—i.e. they cannot be on-sold and do not retain value over time—the whole of the amount of ownership transfer costs is written off as consumption of fixed capital in the same period as the transactions occur. Therefore, these costs do not appear as an asset in the balance sheet.

IDENTIFICATION OF MARKET AND NON-MARKET TRANSACTIONS

A2.13 SNA93 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 product (NIEP) accounts or the I-O tables. However, some major components of non-market output will continue to be available separately in the ASNA.

ILLEGAL ACTIVITIES

A2.14 SNA93 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 which are used to compile estimates of gross mixed income.

NON-PROFIT INSTITUTIONS SERVING HOUSEHOLDS (NPISH)

A2.15 The SNA recommendations are adhered to with regard to the sector 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.

PRESENTATION OF ACCOUNTS IN THE ASNA

A2.16 Two main differences exist between the ASNA and SNA93 in the presentation of accounts. First, the ASNA GDP account is a combination of SNA93 production account and generation of income account; and second, the ASNA income accounts are a combination of the SNA93 accounts for allocation of primary income, secondary distribution of income, and use of income. There are also minor differences in the way information is presented within the accounts and in the level of detail shown.

APPENDIX 3 SEASONALLY ADJUSTED AND TREND ESTIMATES

INTRODUCTION

A3.1 Quarterly time series such as those in national accounts publications are affected by three influences—calendar (mostly seasonal), trend and irregular. When interpreting a quarterly series, it is often helpful to take account of the seasonal and other regular calendar-related influences. The seasonal adjustment process removes these influences, and the remaining (seasonally adjusted) series reflects the trend and irregular influences. The irregular component refers to changes attributable to irregular events such as industrial disputes or lumpy investments. A further statistical process (Henderson smoothing) removes the irregular influence to reveal the trend. This appendix summarises the methods used by the ABS to decompose quarterly national accounts series into their three components.

THE SEASONAL ADJUSTMENT PROCESS

A3.2 Seasonal effects usually reflect the influence of the seasons themselves, either directly or through production series related to them (such as 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).

A3.3 Statistical techniques can be used to evaluate the effects of normal seasonal and other calendar influences operating on a series. If significant stable seasonal or calendar variation is detected, then the estimated effects may be removed from the series to produce a seasonally adjusted series. Although stable calendar variation may be present in a series, factors applying 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.

A3.4 Not all statistical series are significantly affected by seasonal or calendar influences which are regular enough to be described as 'stable', 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

A3.5 The ABS method of seasonal adjustment is the SEASABS (SEASonal analysis to ABS standards) package, a knowledge-based seasonal analysis and adjustment tool. The seasonal adjustment algorithm used by SEASABS is based on the X-11 ARIMA package from Statistics Canada. This in turn is based on the United States Bureau of the Census Method II Seasonal Adjustment Program, X-11 Variant. In the X-11 method, calendar effects, where measurable, are estimated using mainly filtering techniques, and occasionally regression procedures. In certain cases (such as the payment of pensions) additional information may be used to estimate appropriate prior adjustment factors. The estimated seasonal and calendar influences, together with certain prior adjustment factors, provide the combined adjustment factors by which the original series is seasonally adjusted.

A3.6 The X-11 technique proceeds by decomposing 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. The X-11 program includes a statistical procedure for identifying and discounting unusually large or small values included in the original series. Supplementary information is used to assess the results produced by this technique. Occasionally, prior modification of extreme values is undertaken, again using supplementary information, in order to better allow for these influences. This procedure minimises the extent to which the estimated seasonal component is affected by irregular influences. 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. 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.

A3.7 Adjustments are also made prior to seasonal analysis to deal with abrupt discontinuities in the seasonal pattern or the trend where sufficient observations 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. However, it is impossible in most cases to recognise and assess changes in seasonality or trend at the time they occur. The seasonal adjustment process alone cannot indicate whether an unexpected movement appearing in current seasonally adjusted figures denotes a variation in trend, or an unusual (irregular) effect, or whether it is due to an abrupt change in seasonality.

ADDITIVE, PSEUDO-ADDITIVE OR MULTIPLICATIVE ADJUSTMENTS

A3.8 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.

A3.9 Although most series in the ANA 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 AGGREGATIVE ADJUSTMENTS

A3.10 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.

THE ANNUAL SEASONAL REANALYSIS CYCLE AND REVISIONS

A3.11 National accounts series are normally reanalysed annually using data consistent with the June quarter national accounts estimates. On occasions, however, particular components have been reanalysed before the normal time because of one or more of the following conditions:

- there appear to have been significant changes in seasonality;
- major revisions to annual estimates are made which also affect quarterly movements; and/or
- changes have been made to the detailed way in which the seasonal adjustment process has been carried out.

A3.12 Significant revisions can occur as a result of the annual reanalysis, with the more recent periods likely to be most affected. It is particularly difficult to identify and estimate the trend and seasonal components at times of rapid or abrupt changes in these components.

INTERPRETING SEASONALLY ADJUSTED SERIES

A3.13 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 variations 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 in the analyses each year.

A3.14 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. Without doubt they can be a useful aid to critical interpretation, but they are not a substitute for it.

THE TREND ESTIMATION PROCESS

A3.15 In cases where the removal of only the seasonal element from a 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.

A3.16 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 (much like the 'I/C ratio' in X-11). 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.

A3.17 Revisions to the trend series may arise from four factors:

- the availability of subsequent data;
- revisions to the underlying data, especially in more recent periods;
- re-estimation of seasonal factors; and
- asymmetries in the smoothing procedure.

A3.18 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 *A Guide to Interpreting Time Series—Monitoring Trends: an Overview* (Cat. no. 1348.0).

APPENDIX 4 LINKS BETWEEN BUSINESS ACCOUNTS AND THE NATIONAL ACCOUNTS

A4.1 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, or 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:

A4.1 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.

A4.2 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:

A4.2 PRODUCTION ACCOUNT OF A TRADING ENTERPRISE—ALTERNATIVE FORM

	$'000		*$'000*
Wages and salaries	100	Sales	210
Taxes less subsidies on production and imports	13	Changes in inventories	5
Gross operating surplus	52		
Gross product	165		
Current purchases	50		
	215		215

A4.3 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 A4.13 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).

A4.3 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
		General government (capital)	5
Gross product	225	Enterprises for capital purposes	45
Current purchases from general government	1	Overseas (i.e. exports of goods & services)	35
Imports of goods and services	40	Changes in inventories	2
Total turnover	266	Total turnover	266

A4.4 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.)

A4.5 The 'production account' for general government would be on the following lines:

A4.4 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

A4.6. 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.

A4.7 However, 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 as the cost of those services to the organisations themselves, 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'.

A4.8 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).

A4.9 With these changes, and some renaming, the consolidated production account for enterprises can be presented as a consolidated production account for the whole economy:

A4.5 CONSOLIDATED 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
		Gross fixed capital formation by enterprises	45
Taxes less subsidies on production and imports	25	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

A4.10 The derivation of many of the items in this account is quite obvious as they are simply carried down from one of the two preceeding 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 Non-profit institutions serving households ($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 Non-profit institutions serving households ($5m)

A4.11 In effect, this account is the same as the gross domestic product account 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. Chapter 17 provides an account of the conceptual basis for the inventory valuation adjustment and the methods used in estimating it.

A4.12 In the gross domestic product account 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.

A4.13 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 or providing insurance. 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 5 AUSTRALIAN NATIONAL ACCOUNTS AND THE GST

INTRODUCTION

A5.1 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. TNTS has important implications for the national accounts, most of which affect the accounts from the September quarter 2000. For example, current price estimates of GDP increased, but there were no direct effects of TNTS on the chain volume measure of GDP. This appendix explains how the GST is treated in the national accounts and discusses the direct impacts that the changes in the tax system had on the major national accounts aggregates.

THE GST

A5.2 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. Businesses charge GST on goods and services sold to other businesses and to consumers. In most cases, businesses are able to offset the GST they pay on acquisitions, such as purchases of intermediate inputs and capital expenditure, against the GST they collect on their sales. This offset is referred to as an input-tax credit. Businesses remit the net amount of GST collected to the Australian Taxation Office. If the input-tax credit of a business exceeds the amount of GST that it has collected on its sales then it receives a refund for the difference. As such, the GST is ultimately paid by the final consumer. Under most circumstances, sales between businesses are effectively GST-free.

A5.3 Goods and services that are GST-free include:

- most exports of goods and services (the exception is goods and services consumed by visitors to Australia other than those for which visitors can claim a refund on the GST paid);
- basic food;
- health, education and eligible child-care services; and
- supplies of international transport and some related domestic transport and other expenses.

Businesses producing GST-free goods and services are able to claim an input-tax credit on GST paid on their purchases.

A5.4 Services that are input-taxed include:

- financial services; and
- residential rents.

Businesses producing input-taxed services are unable to claim an input-tax credit on GST paid on the inputs to the production of these services. For example, as the purchase of dwellings is considered an input into the supply of residential rents, there is no input-tax credit allowed on such purchases.

A5.5 As a transitional arrangement, input-tax credits on most business purchases of new motor vehicles are as follows: no input-tax credit is allowed in 2000–01, a 50 per cent credit is allowed in 2001–02, and full credits are allowed from 1 July 2002. One exception is that a full input-tax credit is allowed from 1 July 2000 on purchases of motor vehicles that were not previously subject to WST.

A5.6 In another transitional arrangement, a special credit was allowed for WST paid on trading stock held by businesses at 1 July 2000. This ensured that, with the introduction of the GST, there was no double taxation on trading stock.

TREATMENT OF GST IN THE NATIONAL ACCOUNTS

A5.7 SNA93 describes the appropriate conceptual treatment of value added taxes (VAT), of which the GST is a type. Two basic approaches are described: the gross and net methods of recording. To quote the SNA:

> "Under the gross system: all transactions are recorded including the amounts of any invoiced VAT. Thus, the purchaser and seller record the same price, irrespective of whether or not the purchaser is able to deduct the VAT subsequently.'' (SNA93, paragraph 6.210);

and

> ''In the net system: (a) outputs of goods and services are valued excluding invoiced VAT; imports are similarly valued excluding invoiced VAT; (b) purchases of goods and services are recorded including non-deductible VAT.
>
> Under the net system, VAT is recorded as being payable by purchasers, not sellers, and then only by those purchasers who are not able to deduct it. Almost all VAT is therefore recorded in the System as being paid on final uses—mainly on household consumption. Small amounts of VAT may, however, be paid by the businesses in respect of certain kinds of purchases on which VAT may not be deductible.'' (SNA93, paragraph 6.212).

A5.8 SNA93 explains that, within the system of national accounts, the gross method suffers from significant practical and conceptual drawbacks. Because of this, it states that:

> ''The System therefore requires that the net system of recording VAT should be followed.'' (SNA93, paragraph 6.212).

TREATMENT OF GST IN THE NATIONAL ACCOUNTS
continued

A5.9 The ABS uses the net system to record the GST in the national accounts, in line with SNA93 recommendations. The ABS also considers that this is the most appropriate treatment from both a practical and conceptual perspective.

A5.10 According to SNA93, VAT are taxes on products, which are part of the aggregate taxes less subsidies on production and imports. The ABS treats the GST in the same fashion.

IMPACT OF THE NEW TAX SYSTEM ON NATIONAL ACCOUNTS AGGREGATES—CURRENT PRICES

A5.11 Because the GST collects more revenue than the taxes (e.g. WST) on production that it replaced, the current price value of GDP is at a higher level after its introduction.

A5.12 This is most evident from the income measure of GDP, of which taxes less subsidies on production and imports is a component. Clearly, therefore, the increase in taxes on production and imports led to an increase in GDP. The other income components of GDP (compensation of employees, gross operating surplus, gross mixed income) are not directly affected by TNTS.

A5.13 The direct effects of TNTS on the expenditure measure of GDP are as follows:

- *Household final consumption expenditure*—the GST paid by households is included in the estimates for this aggregate, although the increase in expenditure attributable to the GST was offset by the removal of WST and other taxes embedded in the prices paid by households, as well as the removal of taxes paid directly by households (e.g. the NSW bed tax). Overall, the impact of tax reform was to increase prices for many goods and services and this is reflected in higher household final consumption expenditure.
- *General government final consumption expenditure*—this aggregate was largely unaffected by the introduction of the GST. General government bodies are able to claim a refund on GST paid, so general government expenditure is recorded exclusive of the GST. As the general government sector was generally exempt from WST, the removal of these taxes had little impact on general government final consumption expenditure.
- *Private gross fixed capital formation—dwellings*—as the GST paid on new dwellings is not able to be claimed as an input-tax credit, expenditure on this aggregate increased as a result of the GST's introduction, although the increase was partly offset by the removal of WST and other taxes on inputs used in the construction of dwellings.

- *Private gross fixed capital formation*—other components—the agriculture, mining and manufacturing industries were mostly exempt from WST, and businesses in these industries are generally able to claim an input-tax credit on the GST paid on their purchases. An exception is expenditure on passenger motor vehicles, for which these industries were subject to the WST. The replacement of the WST by the GST and the phasing in of the input-tax credit produces a stepped reduction in the net tax payable on the purchase of passenger motor vehicles during the transition period. For the finance industry, there was a downward effect on expenditure due to the removal of WST, but an upward effect due to the input-taxed nature of financial services. For other industries, there was a downward impact on the cost of assets due to the removal of WST. However, this impact is moderated by the phasing in of the input-tax credit on motor vehicles.
- *Public gross fixed capital formation*—general government—this expenditure is recorded exclusive of the GST. As such, TNTS had little affect on this aggregate as most government bodies were previously exempt from WST.
- *Public gross fixed capital formation—public corporations*—for the most part, this expenditure is recorded exclusive of the GST, although in those instances where an input-tax credit cannot be claimed there is an increase in expenditure due to increased prices. There was, however, a downward effect from the removal of WST for those public corporations that were not previously exempt.
- *Changes in inventories*—for the most part, these are recorded exclusive of the GST as most GST paid by businesses on inventories is refundable. As the WST was previously reflected in the values of inventories—particularly those held by retailers—its removal has a downward affect on the level of, and subsequently changes in, inventories.
- Exports of goods and services—most exports of goods and services are not subject to the GST. However, overseas tourists pay GST on goods and services consumed in Australia. While they are able to claim refunds in respect of GST paid on certain goods taken out of the country, the overall effect is one of an increase in prices paid by visitors.
- *Imports of goods and services*—this aggregate was unaffected by TNTS, as imports were and currently are valued on the basis of prices in the country of their origin.

A5.14 In terms of the production measure of GDP (for which current price estimates are only provided annually), TNTS has the biggest impact on the item 'taxes less subsidies on products', which is added to estimates of industry value added at basic prices to obtain estimates of GDP at purchasers' (i.e. market) prices.

IMPACT OF THE NEW TAX SYSTEM ON NATIONAL ACCOUNTS AGGREGATES—VOLUME AND PRICE MEASURES

A5.15 The introduction of the GST and other tax changes had no direct impact on chain volume measures of GDP and other aggregates. This is because the impact of tax reform on the current price estimates is a price effect, and as such it is removed in the derivation of the chain volume measures.

A5.16 The effects of TNTS on prices were reflected in the two types of price measures provided in the national accounts—implicit price deflators and chain price indexes. The former, which are derived by dividing the chain volume measures into the current price measures, reflect both the 'pure' price effect as well the impact of compositional changes associated with tax reform. The chain price measures, on the other hand, only reflect the 'pure' price effect.

SEASONALLY ADJUSTED AND TREND ESTIMATES

A5.17 Because most of the impacts of tax reform on estimates of movement were transitory, users need to exercise caution in interpreting seasonally adjusted and trend estimates of movements in current price aggregates for periods affected by TNTS. As movements in seasonally adjusted estimates include both changes in trend and irregular elements, the direct impacts of the tax changes, which are trend breaks, flowed straight into the seasonally adjusted estimates. Ideally, the impact of TNTS on trend estimates should have been reflected as a break in series. However, as it was not generally possible to quantify the impact of the tax changes, it is generally not possible to reflect TNTS as a break in trend series. Therefore, TNTS had an impact on movements in trend estimates, although these impacts are smoothed and spread over a number of periods due to the nature of the calculation of trend estimates.

A5.18 As the price impacts of TNTS are generally removed in the compilation of chain volume measures, the seasonally adjusted and trend estimates for these aggregates are not affected by the direct impacts of TNTS. However, movements in these estimates are affected by indirect impacts, such as those associated with changes in expenditure patterns.

COMPILATION ISSUES

A5.19 Much of the source data for the national accounts comes from ABS surveys of businesses. The Urgent Issues Group of the Australian Accounting Research Foundation (AARF) addressed the issue of accounting for the GST and signalled a clear preference for a net system of recording by businesses. However, where it has not been practicable for businesses to report in strict accordance with the AARF's preference and the SNA's net system of reporting, the ABS collects the data in accordance with businesses' accounting practices, and adjusts these where necessary.

A5.20 One exception to the ABS preference for net reporting relates to reporting of turnover by retail and selected services businesses. An important use of these data is to measure components of household final consumption expenditure in the national accounts, where it is appropriate that the measure be inclusive of GST.

COMPILATION ISSUES
continued

A5.21 The consumer price index (CPI) measures final transaction prices inclusive of taxes on products, and hence reflects the net effect of the tax changes included in TNTS. This aligns with the inclusion of these taxes in household final consumption expenditure. Therefore, the CPI continues to be suitable for deflating current price estimates in order to compile chain volume measures for those components of household final consumption expenditure where the CPI is used for this purpose.

A5.22 The various producer price indexes produced by the ABS, which are used to deflate other current price estimates in order to compile chain volume measures, are compiled on a basis that is consistent with the net system of recording. However, chain volume measures for some aggregates are compiled using proxy price indexes in the absence of price indexes directly pertaining to the aggregates. In some cases, during the transition period, the tax changes caused changes in the proxy price indexes that were different to those that would have been observed in the 'correct' price indexes—if such indexes were compiled. To ensure that this did not have unintended consequences for the chain volume measures, the ABS adjusted its methods for compiling these measures where necessary. An example of such an adjustment was in the compilation of chain volume measures for gross fixed capital formation, because the proxy price indexes used did not reflect the impact of the removal of WST on asset prices.

APPENDIX 6 LINEAR TREND INTERPOLATION

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).

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

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

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:

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

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

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

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

GLOSSARY

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. The cash income for a year may be substantially different from this because of time lags in payments brought about by the special marketing arrangements for certain agricultural products. Some agricultural products are marketed through marketing boards, co-operatives and other bodies which act as agents for producers. These bodies hold, on the producers' behalf, large stocks of unsold produce for which, in some cases, advance payments are made in the year of delivery while the balance of the ultimate proceeds of sale, less charges, is paid in a subsequent year. Such differences between accrued and actual receipts of agricultural producers are reflected in the item *increase in assets with marketing organisations* which is a deduction made from agricultural income in order to represent more closely the flow of cash income realised by producers in each year. The amounts deducted are the estimated increases in liabilities of marketing organisations to producers. The marketing organisations for which the dates of delivery of primary produce, sale and payment to producers differ most significantly from each other are the Australian Wheat Board Ltd, the Australian Barley Board and wool selling brokers. The item is measured as the estimated gross selling value of products received by these organisations, plus subsidies, less taxes on production and imports, marketing costs and payments to producers. Any excess of accrued over actual receipts is included in the increase in assets with marketing organisations.

Agricultural production costs (other than compensation of employees and consumption of fixed capital) Includes all costs 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 Entities functioning as stores of value and 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). See also *Financial assets; Non-financial assets*.

Base period Refers to the period that provides the weights for an index. See also Reference period.

Basic prices The basic price is 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. 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. See also *Purchasers' prices*.

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 meaning 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.

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 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.

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 revalued 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 (input-output) 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. See also *Input-output table; Supply and use tables*.

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. See also *Individual consumption*.

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, fringe benefits tax). See also *Employers' social contributions; Wages and salaries*.

Computer software

Computer software refers to computer programs, program descriptions and supporting materials for both systems and applications software. Included are purchased software and, if the expenditure is large, software developed on own-account. Large expenditures on the purchase, development or extension of computer databases that are expected to be used for more than one year, whether marketed or not, are also included. See also *Intangible fixed assets*.

Consumption of fixed capital

Consumption of fixed capital is the value, at current prices, 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.

Cultivated assets

Cultivated assets include 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. See also *Livestock; Tangible fixed assets*; and *Vineyards, orchards and other plantations of trees yielding repeat products*.

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 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.

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.

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. See also *Tangible fixed assets*.

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. See also *Basic prices; Purchasers' prices*.

Employees' social contributions

Social contributions payable by employees to private funded social insurance schemes. See also *Employers' contributions to superannuation; Employers' imputed social contributions; Employers' social contributions; Social assistance benefits; Social benefits; Social contributions*; and *Social insurance benefits.*

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. See also *Employees' social contributions; Employers' imputed social contributions; Employers' social contributions; Social assistance benefits; Social benefits; Social contributions;* and *Social insurance benefits*.

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. See also *Employees' social contributions; Employers' contributions to superannuation; Employers' social contributions; Social assistance benefits; Social benefits; Social contributions;* and *Social insurance benefits*.

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.

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). See also *Intangible fixed* assets.

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 land or other tangible non-produced assets rented by the enterprise. See also *Gross operating surplus; Gross mixed income of unincorporated enterprises*.

Exports of goods and services

The value of goods exported and amounts receivable from non-residents for the provision of services by 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 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 that are used in a fashion similar to civilian assets is classified as gross fixed capital formation; expenditure on weapons of destruction and weapon delivery systems is classified as final consumption expenditure.

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. The exceptions are monetary gold, Special Drawing Rights (SDRs), and shares, which are treated as financial assets even though there is no financial claim on another institutional unit. See also *Assets; Insurance technical reserves; Long-term debt securities; Monetary gold and SDRs; Other accounts receivable/payable; Prepayments of premiums and reserves against outstanding claims; Securities other than shares; Shares and other equity*; and *Short-term debt securities*.

Financial derivatives Financial 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. Financial derivatives are used for a number of purposes including risk management, hedging, and speculation. Unlike with debt instruments, no principal amount is advanced to be repaid, and no investment income accrues. The value of the financial derivative derives from the price of the underlying items.

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.

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 tangible and intangible fixed assets. See also *Intangible fixed assets; Produced assets*; and *Tangible fixed assets*.

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' is that part of gross domestic product which derives from production in agriculture and services to agriculture. 'Gross non-farm product' arises from production in all other industries.

Gross fixed capital formation—general government

Expenditure on new fixed assets plus net expenditure on second-hand fixed assets, whether for additions or replacements (other than weapons of destruction and weapon delivery systems). 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

Expenditure on fixed assets broken down into dwellings, other buildings and structures, machinery and equipment, livestock, intangible fixed assets 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, other buildings and structures, 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 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, and property income receivable) and transfers receivable (such as social assistance benefits and non-life insurance claims).

Gross mixed income of unincorporated enterprises

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, land or other tangible non-produced assets required to carry on the production and before deducting consumption of fixed capital. 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 expenditure

Gross national expenditure is the total expenditure within a given period by Australian residents on final goods and services (i.e. before allowances for 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 disposable income

Gross national disposable income 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 income

Gross national income (GNI) is the aggregate value of gross primary incomes for all institutional sectors, including net primary income receivable from non-residents. GNI was formerly called gross national product (GNP).

Gross operating surplus

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, land or other tangible non-produced assets required to carry on the production and before deducting consumption of fixed capital. It excludes the amount described as gross operating surplus—unincorporated enterprises in SNA68, but now referred to as gross mixed income. Gross operating surplus is also calculated for general government, where it equals general government's consumption of fixed capital.

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. See also *Intermediate consumption*.

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.

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'. See also *Collective consumption*.

Input-output table

An input-output table is 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-output tables. See also *Coefficient table; Supply and use tables.*

Institutional sectors

The residential 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. See also *Institutional* units.

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 a corporation, NPI or government unit, are considered institutional units as they are responsible and accountable for the economic decisions or actions they take. See also *Institutional sectors*.

Insurance technical reserves

Insurance technical reserves comprise financial assets that are reserves against 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 sub-sector, 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. See also *Net equity of households on life insurance reserves and on pension funds; Prepayment of premiums and reserves against outstanding claims*.

Intangible fixed assets

Intangible fixed assets are fixed assets that consist of mineral exploration, computer software, entertainment, literary or artistic originals, and ownership transfer costs, and which are intended to be used for more than one year. See also *Computer software; Entertainment, literary or artistic originals*; and *Mineral exploration*.

Intangible non-produced assets

Intangible non-produced assets are 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, purchased goodwill and other intangible non-produced assets. See also *Non-produced assets*.

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. See also *Gross value added*.

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. They 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.

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.

Livestock assets

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 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).

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. See also *Financial assets.*

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.

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. See also *Dwellings; Tangible fixed assets*.

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. See also *Intangible fixed assets*.

Monetary gold and SDRs (Special Drawing Rights)

Monetary gold and SDRs (Special Drawing Rights) are financial assets for which there is no corresponding financial liability.

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.

SDRs are international reserve assets created by the International Monetary Fund (IMF) and allocated to its member States to supplement existing reserve assets. They are held exclusively by official holders, which are normally central banks. See also *Financial assets*.

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.

Net equity of households on life insurance reserves and on pension funds

Net equity of households on life insurance reserves and on pension funds refers to reserves held against life insurance and annuity policies by insurance enterprises, whether mutual or incorporated, and by pension funds. These reserves are considered to be assets of the policyholders and not of the institutional units that manage them.

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 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 superannuation funds (including net earnings on these funds), increased equity in unfunded superannuation schemes and the increase in farm assets with marketing boards.

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).

Non-financial assets

Non-financial assets are assets for which no corresponding liabilities are recorded. See also *Assets; Financial assets; Non-produced assets;* and *Produced assets*.

Non-produced assets

Non-produced assets are non-financial assets that come into existence other than through processes of production. Non-produced assets consist of tangible assets and intangible assets. See also *Intangible non-produced assets; Tangible non-produced assets*.

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'.

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. See also *Financial assets*.

Other buildings and structures

Other buildings and structures 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.

'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. See also *Tangible fixed assets*.

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. The subsidies may also be intended to cover some or all of the costs of training schemes organised or financed by enterprises. Subsidies aimed at reducing pollution are also included. See also *Subsidies on products*.

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. See also *Current taxes on income; Taxes on production and imports*; and *Taxes on products*.

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.

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.

Perpetual inventory method (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 capital formation undertaken in previous years, have survived to the current period.

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 policyholders.

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. See also *Financial assets*.

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 tangible non-produced 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.

Produced assets Produced assets are non-financial assets that have come into existence as outputs from production processes. Produced assets consist of fixed assets and inventories. See also *Fixed assets; Inventories*.

Producer's prices The producer's price is the amount receivable by the producer from the purchaser for a unit of a good or service.

Property income Property income is the income receivable by the owner of a financial asset or a tangible non-produced asset in return for providing funds to, or putting the tangible non-produced asset at the disposal of, another institutional unit. Property incomes are received by the owners of financial assets and tangible non-produced 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.

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. See also *Basic prices; Economically significant prices*.

Quasi-corporations Quasi-corporations are unincorporated enterprises that function as if they were corporations. Three main kinds of quasi-corporations are recognised by SNA93, 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 is equal to the chain volume measure of gross domestic product adjusted for changes in Australia's terms of trade.

Real gross national income (RGNI) 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. RGNI was formerly called real gross national product. It is derived as the sum of the chain volume estimate of GDP (using the income approach) and real net primary income receivable from non-residents. The latter is derived by deflating the nominal measure with the implicit price deflator for domestic final demand.

Reference period In connection with price or volume indices, the reference period means the period to which the indices 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. See also *Base period*.

Secondary income Secondary income consists of receipts and payments of current transfers.

Securities other than shares

Securities other than shares are financial assets that are normally traded in the financial markets and that give the holders the unconditional right to receive stated fixed sums on a specified date (such as bills) or the unconditional right to fixed money incomes or contractually determined variable money incomes (bonds and debentures). With the exception of perpetual bonds, bonds and debentures also give holders the unconditional right to fixed sums as repayments of principal on a specified date or dates. See also *Financial assets*.

Examples include securities such as bills, bonds, debentures, financial derivatives, negotiable certificates of deposit, bankers' acceptances, commercial paper, negotiable securities backed by loans or other assets, preferred stocks or shares that pay a fixed income but do not provide for participation in the residual earnings or value of a corporation, and bonds that are convertible into shares. 'Securities other than shares' may be subdivided between short-term and long-term. See also *Financial assets; Long-term debt securities*; and *Short-term debt securities*.

Shares and other equity

Shares and other equity are financial assets that are instruments and records acknowledging, after the claims of all creditors have been met, claims to the residual value of incorporated enterprises. Equity securities do not provide the right to a predetermined income or to a fixed sum on dissolution of the incorporated enterprise. Ownership of equity is usually evidenced by shares, stocks, participation, or similar documents. Preferred stocks or shares which also provide for participation in the distribution of the residual value on dissolution of an incorporated enterprise are included.

Proprietors' net equity in quasi-corporate enterprises is one of the components of 'shares and other equity' although it is not distinguished as a separate category in the classification. Shares are subdivided between those listed and those not listed on the Australian Stock Exchange. See also *Financial assets*.

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. See also *Financial assets*.

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. See also *Employees' social contributions; Employers' contributions to superannuation; Employers' imputed social contributions; Employers' social contributions; Social benefits; Social contributions*; and *Social insurance 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 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. See also *Employees' social contributions; Employers' contributions to superannuation; Employers' imputed social contributions; Employers' social contributions; Social assistance benefits; Social contributions*; and *Social insurance 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. See also *Employees' social contributions; Employers' contributions to superannuation; Employers' imputed social contributions; Employers' social contributions; Social assistance benefits; Social benefits*; and *Social insurance benefits*.

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. See also *Employees' social contributions; Employers' contributions to superannuation; Employers' imputed social contributions; Employers' social contributions; Social assistance benefits; Social benefits;* and *Social contributions*.

Statistical discrepancy (I), (E) and (P)

For years in which a balanced supply and use 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.

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. See also *Other subsidies on production*.

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. See also *Coefficient table; Input-output table*.

Tangible fixed assets Tangible fixed assets consist of dwellings; other buildings and structures; machinery and equipment; and cultivated assets. See also *Dwellings; Other buildings and structures; Machinery and equipment;* and *Cultivated assets*.

Tangible non-produced assets Tangible non-produced assets are non-produced assets that occur in nature and over which ownership may be enforced and transferred. Environmental assets over which ownership rights have not, or cannot, be enforced, such as international waters or air space, are excluded. Tangible non-produced assets consist of land, subsoil assets, non-cultivated biological resources and water resources. See also *Non-produced assets*.

Taxes on production and imports Taxes on production and imports consist of 'taxes on products' and 'other taxes on 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. See also *Current taxes on income and wealth; Other taxes on production;* and *Taxes on products*.

Taxes 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. See also *Current taxes on income and wealth; Other taxes on production;* and *Taxes on production and imports*.

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.

Total agricultural factor income

Total agricultural factor income is that part of total factor incomes arising from production in agriculture and services to agriculture, and 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.

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.

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, and also includes advances for work that is in progress (if classified as such under inventories) or is to be undertaken. See also *Financial assets; Other accounts receivable*.

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.

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. Wages and salaries are also measured as far as possible on an accrual rather than a strict cash basis. See also *Employers' social contributions; Compensation of employees*.

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