5216.0.55.002

Australian Bureau of Statistics

Information Paper

Quality Dimensions of the Australian National Accounts

Australia

2007

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AUSTRALIAN BUREAU OF STATISTICS

EMBARGO: 11.30AM (CANBERRA TIME) FRI 31 AUG 2007

ABS Catalogue No. 5216.0.55.002

ISBN 9780642483249

Produced by the Australian Bureau of Statistics

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PREFACE

This information paper provides a wide-ranging discussion of aspects related to the quality of the Australian national accounts statistics. The paper updates and extends the discussion of quality issues contained in Chapter 29 of the ABS publication, *Australian System of National Accounts, Concepts, Sources and Methods, 2000* (cat. no. 5216.0) and in the *Feature Article 'A Quality Assessment of the National Accounts Information System'* published in the March quarter 2003 edition of the *Australian National Accounts: National Income and Expenditure* (cat. no. 5206.0).

The paper first discusses the issues associated with, and factors that influence, the overall quality of statistical data and specifically, national accounts data. It then discusses how the use of a quality framework can facilitate the assessment of the effectiveness of the national accounts statistical program against a set of defined quality dimensions. The paper then provides a broad assessment of the national accounts program against the six quality dimensions that make up the ABS quality framework. This includes a description of recent work undertaken by the ABS to determine the impact of revisions on the overall quality of national accounts outputs.

The ABS invites comments from interested readers as to the usefulness and accuracy of this type of analysis as a guide to the implications of data quality issues when using ABS national accounts statistics. Your comments will assist the ABS in prioritising quality related tasks in its national accounts forward work program and in determining the frequency and content of future publications and articles dealing with quality issues. Your comments should be forwarded to Michael Smedes (michael.smedes@abs.gov.au).

Denis Farrell
Acting Australian Statistician

ABBREVIATIONS

ABN	Australian Business Number
ABR	Australian Business Register
ABS	Australian Bureau of Statistics
ASNA	Australian System of National Accounts
CoE	compensation of employees
CSM	concepts, sources and methods
DQAF	Data Quality Assessment Framework
ESUG	Economic Statistics User Group
Eurostat	Statistical Office of the European Communities
FAME	Forecasting, Analysis and Modeling Environment
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
GFCF	gross fixed capital formation
GMI	gross mixed income
GOS	gross operating surplus
HAC	heteroskedasticity autocorrelation consistent
HFCE	household final consumption expenditure
IMF	International Monetary Fund
MQV	making quality visible
NSS	National Statistical Service
OECD	Organisation for Economic Co-operation and Development
QSU	quarterly supply and use
RSE	relative standard error
SAUG	State Accounts User Group
SNA	System of National Accounts
SNA93	System of National Accounts 1993

SECTION 1 SUMMARY

INTRODUCTION

The ABS mission is 'to assist and encourage informed decision making, research and discussion within governments and the community, by leading a high quality, objective and responsive national statistical service'. 'Quality' in relation to statistics is a multidimensional concept which embodies the notion of 'fitness for purpose'. In order to assist and encourage informed decision making, statistics need to be not only as accurate as possible, but also timely and relevant. There are often trade-offs between the various aspects of quality, and in order to make economic statistics timely enough to be relevant indicators for the analysis of current or recent economic conditions this is likely to be at the expense of some degree of accuracy. The ABS, in consultation with data users, aims to optimise the various aspects of quality.

This paper is part of the ABS initiative for 'making quality visible'. The national accounts program is discussed against the six quality dimensions of the ABS Data Quality Framework. These dimensions are a view of data quality aspects that determine fitness for purpose, and relate to relevance, accuracy and reliability, timeliness, accessibility, interpretability and coherence. As well as informing users about quality, the framework also provides feedback to ongoing quality improvement programs within the ABS.

Underlying these dimensions of quality is the notion of integrity – that statistical policies and practices are guided by ethical standards and professional principles which are transparent. The integrity of the ABS is underpinned by legislation within which the organisation operates, and its willingness to subject its operations and performance to both internal and external scrutiny. The principle legislation determining the functions and responsibilities of the ABS are the *Australian Bureau of Statistics Act 1975* and the *Census and Statistics Act 1905*. These Acts provide that the ABS is headed by the Australian Statistician – a statutory office with an independent status and the authority to conduct statistical collections.

ACCURACY

Accuracy remains the main focus of ABS quality control. However, in the case of the national accounts, it is recognised internationally that an objective accuracy measure in the sense of proximity to the 'true value' is impossible to produce. The national accounts are a highly complex set of economic statistics. They combine a very large number of internal and external data sources covering various aspects of the economy to derive GDP and other headline measures.

The national accounts compilation process transforms the various partial data into a set of economic accounts. To make the data more analytically useful it also requires a further transformation of the data to produce the headline chain volume, seasonally adjusted/trend estimates of GDP and components. These measures involve data transformations, requiring various assumptions.

ACCURACY *continued*

Given the variety of data used, and the transformations and aggregations inherent in the national accounts process, an assessment of accuracy is necessarily subjective and indirect. It involves an assessment of the national accounts process itself, the input data and the various transformations involved in producing the national accounts. The ABS aims to achieve best practice in each of these facets of national accounts compilation. The related quality concept of reliability can be objectively measured by an analysis of revisions, but a reliable series is not necessarily accurate, if it is based on poor quality data.

The international *System of National Accounts, 1993* (SNA93) is used as a coordinating and integrating framework for the collection of data and standard definitions, classifications and collection units are based on it. The national accounts system also provides an important basis from which relative priorities for the collection of data for the various aspects of economic activity are assessed. The ABS economic statistics program uses best practice in survey design and operation. The introduction of the new tax system in 2000 has enabled a number of enhancements via the establishment of the Australian Business Register and also the increased opportunity for supplementation of ABS data collections with taxation data. In particular, the scope of the annual economic collection outputs has now been increased to include non-employing businesses.

Because of the data intensive needs of the national accounts system and the cost and respondent load imperatives that apply, it will often be the case that national accounts compilers have to make do with data that is of less than ideal quality and sometimes, significantly so, despite the best scientific basis used in survey design. This is more so for data at a finer level of detail where the standard errors are higher. Even with good survey design, important sources of potential error remain. Survey respondents will not necessarily maintain their own accounting records at the detailed level required for national accounts compilation, or they may misinterpret the requirements or take insufficient care. Monthly and quarterly collections in particular will draw on management accounts which are themselves often preliminary and subject to revision and end of year accounting adjustments. The national accounts compilation process is designed to mitigate input data issues, but good quality input data is essential to good quality national accounts data. Ensuring that the quality of input data is suitable for national accounts requirements is an ongoing focus.

The Australian national accounts range of outputs is consistent with the SNA93 and world's best practice. This is also true for the compilation process used. In particular, the components of GDP in annual terms are confronted and balanced within a supply and use table and the results are used to benchmark the quarterly accounts. Quarterly GDP expenditure, production and income components are not balanced, but the compilation procedures incorporate a review process designed to identify data inconsistencies and improbable movements, so they can be investigated as far as possible before publication. This process is assisted by a quarterly supply and use model that has been developed by the ABS for use as an editing tool.

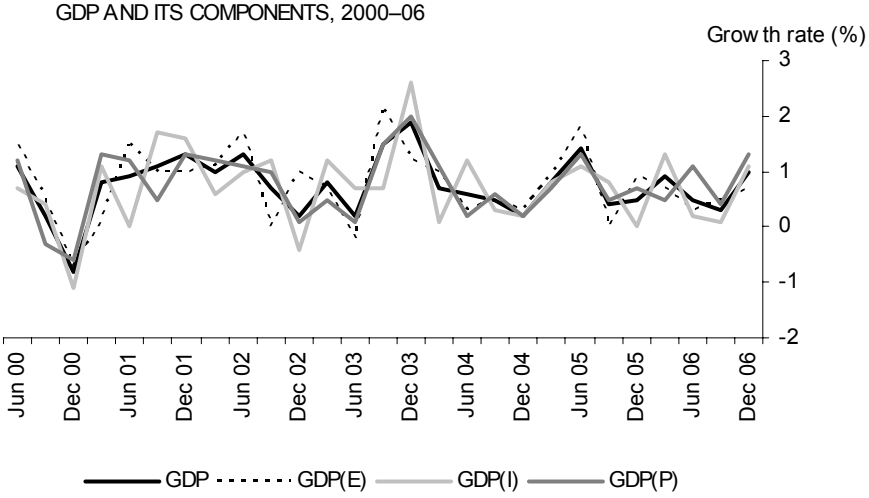
Although the GDP components are fully consistent in annual terms (for years prior to the latest complete year), inconsistencies remain in the quarterly data between the conceptually equivalent expenditure, production and income components. Quarterly GDP is derived in Australia as the average of the three components. The difference

ACCURACY *continued*

between GDP and the components are shown as explicit statistical discrepancy items in the accounts. Graph 1 illustrates the coherence of the data in percentage change terms, thereby providing some indication of the accuracy of the quarterly growth estimates.

Although there are quarter-to-quarter inconsistencies in the data, the important question is whether the data provides a good indication of growth in the economy, or looked at another way, does the information content in the data outweigh statistical noise? From a visual inspection of the data it could be concluded that the picture is mixed, indicating that too much emphasis should not be placed on individual quarters in isolation. Over the 75 quarters from June quarter 1988 (a shorter period is shown in the graph for reasons of clarity), the disparity in growth rates between the strongest and the weakest component was less than or equal to 0.5 percentage points in 25% of quarters and less than or equal to 0.3 percentage points in 10% of quarters. If only the two most consistent data items at each point in time are taken into account, the coherence improves as in 70% of cases the difference is less than or equal to 0.3 percentage points.

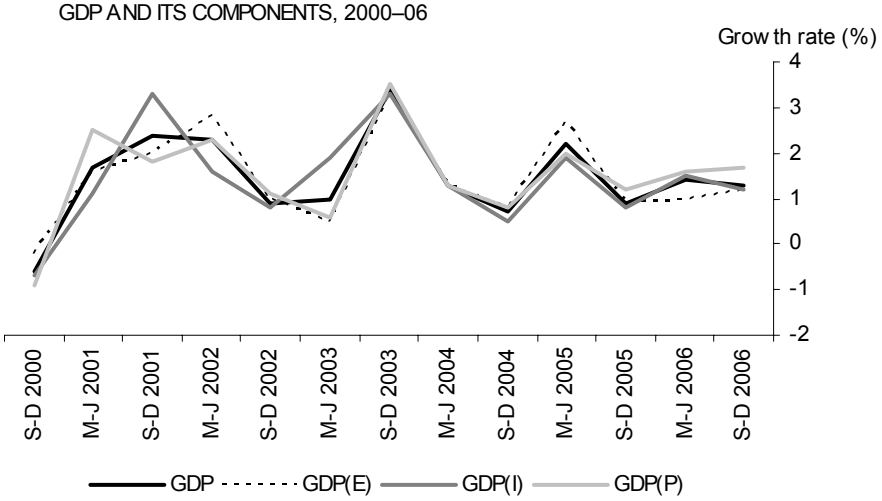
GDP AND ITS COMPONENTS, 2000–06



However, if the data are viewed on a six monthly rather than a quarterly basis as shown in Graph 2, the timing and other inconsistencies in the GDP components are significantly reduced. The practice of deriving GDP as the average of the expenditure, production and income components acts to smooth out the timing noise in the data and produces a smoother series. GDP is most highly correlated to the production-based measure.

ACCURACY *continued*

GDP AND ITS COMPONENTS, 2000–06



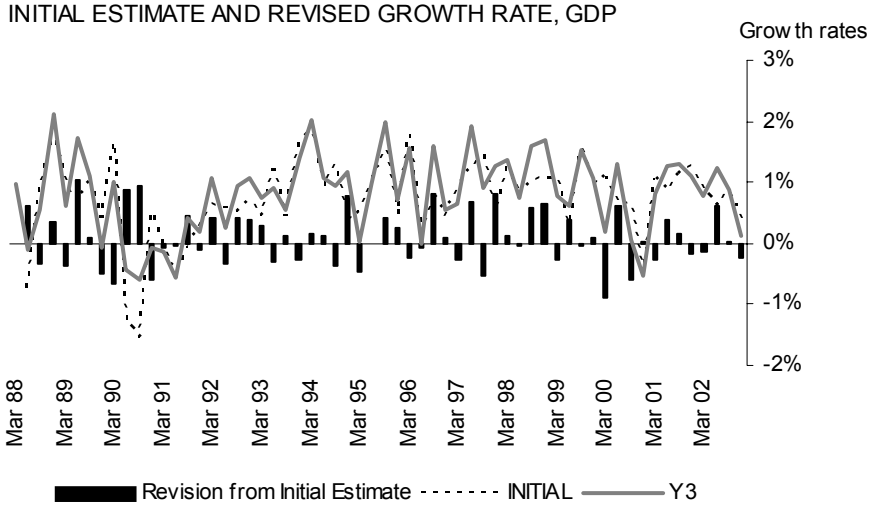
Revisions are an inherent part of the national accounts compilation process. Initial estimates are revised as later and increasingly comprehensive data become available. In part they are a consequence of the demand for estimates to be as timely as possible. The process of establishing different views of the data – chain volume and seasonally adjusted/trend estimates – also results in revisions as new annual price weights are introduced and seasonal factors are re-estimated as new quarters are added and previous quarters are revised. From time to time changes to national accounting standards or upgrades to data sources and methods also result in historical revisions to the whole length of the series.

Revisions could be reduced by adopting restrictive practices as to when more complete data can be incorporated into the accounts, but this would likely be at the expense of accuracy. Although users expect revisions, they will want to be satisfied that initial estimates of economic growth contain reliable information about changes in economic conditions. Graph 3 below shows initial estimates of chain volume, seasonally adjusted GDP compared with estimates for the same quarter three years later.

The average spread of revisions in the study period was 0.37 percentage points, compared with the average absolute growth rate of 0.9 percent. One-third of revisions were less than or equal to 0.2 percentage points. Initial estimates successfully indicated that the economy was growing above or below the long term trend rate 75% of the time. Economic measurement is typically more difficult around turning points and recession periods. Initial estimates of GDP successfully identified the turning points surrounding the 1990–91 recession, but indicated a deeper decline in the early period and a stronger temporary recovery in the middle.

ACCURACY *continued*

INITIAL ESTIMATE AND REVISED GROWTH RATE, GDP



Initial estimates of quarterly GDP were revised upwards on average by 0.1 percentage point per quarter. Tests showed this to be statistically significant, although the earlier quarters in the study were the main contributors to this result. This will be the subject of further investigation, but it cannot be concluded that future estimates will also have a tendency to be revised upwards.

OECD research shows that the average spread of revisions to Australia's GDP growth is in the middle of the 18 OECD countries included in their study.

Some component series have been revised substantially, although users could be expected to have a different level of tolerance to revisions depending on a series' volatility. The mean absolute revision to quarterly growth in private gross fixed capital formation was quite high at 2.2 percentage points, but for much of the period the initial estimates provided a reasonable indicator of growth considering the volatile nature of the series. Components that should receive the highest priority for future work are change in inventories, private and public gross fixed capital formation, and government final consumption expenditure. Growth in these series can be substantially revised, and given their volatility they are large expenditure-side contributors to revisions to growth in GDP.

When forming a view about the economy, it could be expected that users of economic data will not only consider the estimates for any one quarter or any one piece of economic data in isolation. The ABS warns that:

> '...given the qualifications regarding the accuracy and reliability of the quarterly national accounts, trend estimates provide the best guide to the underlying movements, and are more suitable than either the seasonally adjusted or original data for most business decisions and policy advice' (*Australian National Accounts: National Income and Expenditure* (cat. no. 5206.0), Explanatory Notes).

Incremental improvements can and are being made to the accuracy of data sources and processes used in the national accounts. However, there are limits to what can realistically be achieved. Putting aside extra data collection costs and respondent load in improving the accuracy of surveys, there are limitations to the quality of data businesses can, or are prepared to, provide the ABS within the time frame needed to produce the quarterly accounts. Initial data in particular should be considered only as indicators to be

ACCURACY *continued*

replaced as more complete data becomes available over time. Even then, quarter-to-quarter timing inconsistencies are likely to remain, although they will eventually be benchmarked to higher quality annual data.

Drawing together knowledge about the accuracy of the input data, the national accounts processes and the revisions history of the estimates, the ABS publishes 'accuracy ratings' for initial estimates of quarterly GDP and components that users can take as a guide when considering fitness for purpose of the data. GDP and high level data items such as domestic final demand, household final consumption expenditure, exports and imports of goods and services and compensation of employees are rated as 'good'. Initial volume estimates of gross fixed capital formation is rated as 'fair' and change in inventories and government final consumption expenditure are rated as 'poor'.

The following table contains an assessment for the initial quarterly estimates of movement for the current price and chain volume estimates of expenditure and income components of GDP. Each component has been assigned one of the following grades:

A good
B fair
C poor
D very poor

ACCURACY *continued*

ACCURACY RATINGS, Expenditure and Income components of GDP—Initial quarterly estimates of movements

	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	C	C
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	. .
Gross operating surplus		
Non-financial corporations		
Private	A	. .
Public	B	. .
Total non-financial corporations	A	. .
Financial corporations	C	. .
General government	A	. .
Dwellings owned by persons	A	. .
Total gross operating surplus	A	. .
Gross mixed income	C	. .
Total factor income	A	. .
Taxes less subsidies on production and imports	A	. .
GDP	A	. .

. . not applicable

TIMELINESS

ABS aims to release the quarterly national accounts on the first Wednesday of the third month following the quarter. Although there is some variation in country practice, most also aim to release quarterly GDP and components around 60–70 days after the end of the quarter. Countries in the euro area aim to release estimates of GDP growth earlier (around 45 days after the end of the quarter). Some countries also produce preliminary or 'flash' estimates much earlier based on indicator data such as monthly production indexes. Australia has not followed this approach. Countries make different judgements

TIMELINESS *continued*

about the benefit gained from preliminary or flash releases compared with the potential costs of impaired accuracy and greater revisions. Operational considerations are also relevant.

RELEVANCE AND INTERPRETABILITY

The relevance and interpretability of the national accounts stems from Australia's adherence to the latest international standards for national accounts, SNA93, and the contribution of a wide range of economic data users and economists to the development of those standards. The Australian national accounts includes the full range of core statistics recommended in SNA93 including national and sector balance sheets. It has made substantial advances on special topics such as productivity statistics and satellite accounts for tourism, information technology and non-profit institutions. Feature articles on special topics of interest are also published regularly. Considerable resources are devoted to the development of new data items and this work relies heavily on feedback from data users as to statistical priorities. The national accounts program also engages with the international statistical community to learn and to share experiences.

COHERENCE

The coherence of data is an aspect of quality closely associated with accuracy, both within the national accounts system itself, and compared with the various partial indicators of the economy. A major unifying feature within the Australian System of National Accounts is the use of supply and use methodology to confront the data and balance the components of GDP in annual terms.

The ABS publishes a large amount of data on various aspects of the economy. As the majority of these are used in the national accounts it could be expected that there would be coherence between the partial indicators data and the national accounts. While there are some differences in coverage and concept, there are formal processes in place to ensure that the various collections and national accounts staff come to a common view of the statistical treatment of current economic events. National accounts staff also have the opportunity to comment on the partial indicators before they are finalised for publication. None the less, over time, the process of annual benchmarking may lead to some divergence from the partial indicators.

On occasions, officials and commentators have questioned the coherence of national accounts and other economic data such as employment growth and taxation revenues. The relationship between growth in GDP and employment is complex, and leads and lags have been observed historically. There are many differences between income in the national accounts and the income tax base. For example, operating surplus in the national accounts excludes capital gains and losses and does not deduct net interest payments.

CONCLUSION

This paper discusses the issues associated with, and factors that influence, the overall quality of national accounts data. This includes how the use of a quality framework can facilitate the assessment of the effectiveness of the national accounts statistical program against a set of defined quality dimensions. The paper provides a broad assessment of the national accounts program against the six quality dimensions that make up the ABS quality framework. The ABS is interested to receive comments and suggestions from users of the national accounts. These can be expressed either through the consultative fora already in place or by contacting national accounts management.

SECTION 2 DEFINING AND MANAGING QUALITY

DEFINING QUALITY

Among statistical agencies there is no commonly accepted definition of data quality for official statistics. Statistical quality in the past might have been synonymous with accuracy, but today a consensus is emerging that quality is a much wider multidimensional concept. The most commonly accepted way of defining data quality is in terms of the broad notion of 'fitness for purpose'. Fitness for purpose encompasses not only the accuracy and reliability of statistical outputs but also other characteristics, such as relevance and timeliness, that determine how effectively statistical information can be used. While some aspects of quality can be assessed in a more or less objective way, an assessment of the wider concept of fitness for purpose is largely subjective as it also brings to account other factors including user views, the soundness of statistical practices and corporate culture, more generally, within the statistics agency. Quality is not absolute. There are a number of trade-offs in the various aspects of quality that have to be managed in consultation with users. It also has to be seen in the context of what is feasible in practice.

INTEGRITY

A necessary prerequisite for any discussion of quality is an understanding of the notion of integrity. This relates to the need for statistical systems to be based on the principles of objectivity in the collection, compilation and dissemination of data to ensure unbiased statistics which are not subject to confidentiality breaches or premature release. Key to this notion is the legislative framework, organisational structure, planning and quality of the managment practices of the ABS.

The ABS is headed by the Australian Statistian – a statutory office. The Australian Statistician determines which statistics are collected, after full dicussion with users and the Australian Statistics Advisory Council, and makes the results widely available. The independent status of the Australian Statistician is specified in law. This helps to ensure the ABS's impartiality and independence from political influence.

The *Census and Statistics Act, 1905* provides the Statistician with the authority to conduct statistical collections and, when necessary, to direct a person to provide statistical information. The same Act imposes on the ABS obligations to publish and disseminate compilations and analyses of statistical information and to maintain the confidentiality of information collected under the Act.

The *Australian Bureau of Statistics Act, 1975* requires the Statistician to prepare an annual report on the operations of the ABS for presentation to Parliament. This Act also established the Australian Statistical Advisory Council to assist the ABS fulfil its role. The Council is the key advisory body to the ABS and provides valuable input to the directions and priorities of the ABS work program. The ABS is financed via Parliamentary appropriations for its administration and programs. Its financial statements are audited annually by the Australian National Audit Office. Together these elements provide an

INTEGRITY *continued*

environment conducive to the production of high quality national accounts and other statistics.

The ABS also adopts practices which protect the practice and perception of independence and include:

- The advertisement of all scheduled release dates for publications up to twelve months in advance. Daily press and media releases inform users of publications being released each day. This information is also available on the ABS web site. Release of all publications is subject to a strict publicly known embargo policy that ensures impartiality, an essential element of integrity.
- The publication of the ABS three year Forward Work Program. This demonstrates the open statistical process by describing for each ABS program the resources, outputs, clients and uses of statistical information, and the proposed main developments over the next three years. The Forward Work Program is published in hard copy each year and is also available on the ABS web site.
- The release of information about statistical standards, frameworks, concepts, sources and methods in a range of information papers and other publications in hard copy or electronically. This ensures that the public are informed about changes to statistical processes. Details of major revisions to published data are described in the explanatory notes of the relevant publication.

QUALITY MANAGEMENT IN THE ABS

The ABS's strong commitment to maintaining and improving the quality of its statistical program is reflected in its Mission Statement 'to assist and encourage informed decision making, research and discussion within governments and the community by providing a high quality, objective and responsive national statistical service'.

The development of appropriate service charters provide a clear articulation of ABS quality service objectives. The ABS currently has two such service charters. The Client Service Charter describes the relationship between the ABS and users of its products and services. The Business Surveys Charter sets out the relationship between the ABS and businesses that provide it with information for statistical purposes. Both Charters include performance standards for the relationships between the ABS and its clients, and its service delivery. Copies of the Charters are available on the ABS website and through bookshops located in each ABS office.

Making Quality Visible (MQV) has been a key focus of the ABS since the late 1990s. The main tenet of MQV is that the users of ABS statistics need to understand the quality of those statistics in order to judge whether they are suitable for purpose. A Data Quality Framework has been developed to provide a basis for Quality Declarations surrounding ABS statistics. Work done by Statistics Canada and the International Monetary Fund (IMF) were important inputs to the Australian development. More recently, the increased importance of web-based dissemination of statistics has introduced new challenges to MQV, and the ABS is currently considering options for Quality Declarations and complementary Quality Statements that can be linked to statistical outputs released in a web-based environment.

QUALITY MANAGEMENT IN THE ABS *continued*

No single group within the ABS has responsibility for assuring the quality of ABS statistics. Rather, each ABS statistical area, including the area responsible for the compilation of the national accounts, is responsible for continuous quality review and improvement. Each subject matter and support area in the ABS provides a regular report to the senior management forum, highlighting progress and problems in their area and providing performance measures.

While the ABS does not have a centralised quality management system, the quality of ABS statistics is underwritten by the application of good statistical methods during all stages of a collection including the design stages. The ABS has a relatively large Methodology Division which is responsible for ensuring sound and defensible methods are applied to all collections and compilations. Also, the Methodological Advisory Committee, a group of academic experts, provides independent reviews of ABS statistical methods.

The ABS puts substantial effort into developing statistical standards, including concepts, data item definitions, classifications and question modules. Standard rules are adopted for survey frame maintenance, field collection and estimation, and generalised processing facilities are available to support the use of these rules. All ABS surveys must use these standards.

In the area of economic statistics, the international system of national accounts (SNA) is used as a coordinating and integrating framework for the collection of data. A dedicated area of the ABS has responsibility for the management of the integration process, and to ensure that appropriate standard definitions, classifications and collection units are used in all economic collections consistent with the system of national accounts. The national accounts system also provides an important basis from which relative priorities for the collection of data for the various aspects of economic activity can be assessed. The 'annual integrated collections' program of industry surveys are designed around national accounts priorities and user priorities for other data on specific issues.

At the output end of collections, each subject matter area is required to confront its data with other ABS data and with external information, to ensure statistical coherence. The key macro-economic statistics are "signed off" in meetings established for the purposes of clearing the statistics.

Key measures for demonstrating reliable/accurate statistics include high response rates, low sample errors and the timeliness of ABS statistics. A standard set of measures has been developed to present a comparison of quality across collections. The key indicators are also included in the ABS's annual report.

A further key element is the availability of information to enable users to make their own assessment of quality. Information on reliability and accuracy, as well as extensive information on the statistical methods used in collections are routinely provided in concepts, sources, and methods manuals, information and research papers and explanatory notes in publications and on the ABS website.

While assessing quality for any statistical collection is never easy, it is particularly difficult in the case of the national accounts. By design, the national accounts are compiled within a framework that integrates a wide range of statistics covering the whole economy. The accounts utilise a myriad of data sources, both internal and external to the

QUALITY MANAGEMENT IN THE ABS *continued*

ABS which become available at differing time periods. The integration of these diverse statistics is a complex task requiring the use of a wide range of methodologies, processes and procedures. The resultant datasets typically then undergo several revisions as more and better source data are incorporated into the system over time.

Because of these complexities, national accounts data cannot be subjected directly to error measures, such as sampling bias and variance, that are normally associated with statistical outputs based solely on survey methodology. This makes quality measurement for the national accounts an even more subjective process than quality measurement for outputs based on, say, a single survey collection. An overall view about the quality of the national accounts has to be built up from a staged assessment of the data and statistical process used to produce national accounts outputs. In assessing quality, the following three distinct phases in the processing cycle need to be considered:

- the input data
- the transformation of the input data into intermediate data
- the transformed output data.

SECTION 3 QUALITY FRAMEWORKS

INTRODUCTION

While it is not possible to have a single measure of quality for the national accounts program, it is possible to gain insight into their quality by analysing each aspect of quality separately and in a systematic fashion and then bringing them together to obtain an overall picture. To facilitate this process it is useful to use a data quality framework. As well as providing an overall picture of quality, such an approach can also be useful in identifying those areas of the statistical program most in need of immediate attention so that an action plan and resource requirements can be identified. Where the same or similar quality assessment frameworks are adopted by statistical agencies in other countries it also facilitates international comparisons and assessments against international best practice. Two such possible frameworks are, the ABS Data Quality Framework and the IMF Data Quality Assessment Framework (DQAF).

THE ABS DATA QUALITY FRAMEWORK

The ABS has built its own quality framework adapted from the one developed by Statistics Canada. While similar to the DQAF in structure, the ABS quality framework adopts a less detailed, more product oriented approach to quality assessment compared with the more holistic approach of the IMF framework which has a more international focus in order to be relevant for statistical systems that are in various stages of development. For instance, the ABS framework does not cover the governance, institutional and organisational arrangements of the statistical organisation; it takes the DQAF dimensions of 'prerequisites' and 'integrity' as external to the definition of quality. Notwithstanding these differences in emphasis, both approaches should be considered as complementary ways of assessing data quality.

The ABS quality framework identifies the following six dimensions of quality:

- relevance
- accuracy
- timeliness
- accessibility
- interpretability
- coherence.

In using this framework, it is important to understand that these six dimensions of quality are not independent of each other. The various elements of quality have a complex relationship and any action taken to address or modify one aspect of quality may affect one or more of the other elements. For example, all the other dimensions of quality impact on relevance and information provided to ensure statistics are interpretable will also serve to define coherence. Inevitably trade-offs must also be made between accuracy and timeliness, between continuity over time and revisions, between depth and completeness and response burden on data suppliers. Despite such dependencies and conflicts, the six dimensions can provide a useful basis for examining how quality should be managed within a statistical organisation. Achieving an acceptable

THE ABS DATA QUALITY FRAMEWORK *continued*

level of quality is the result of addressing, managing, and balancing the various factors or elements that constitute better quality. Paying attention to the program objectives, the major uses of the data, costs and conditions that affect quality and user expectations is also important in determining an acceptable level of quality. The decision and actions that achieve this balance are based on knowledge, experience, reviews, user consultation and feedback, and judgement.

The following table defines each of the six dimensions of the ABS quality framework and describes their relationship to the national accounts statistical program. The third column of the table provides a brief summary of the mechanisms used by the ABS to assure quality in relation to each of the quality dimensions.

Dimension	ABS elements as they relate to the National Accounts	Mechanisms used to assure quality
Relevance: the degree to which the statistical information meets the real needs of the users.	• Key user needs addressed • Scope • Concepts • Classifications • Basis for recording	• Client and stakeholder feedback mechanisms in place • Regular program reviews, priority settings and planing • Conformity with international standards
Accuracy: the degree to which the information correctly describes what it is designed to measure. • the input data • the transformation of the input data to output • the further editing of transformed output data • coherence	• Coverage of data sources • Input data errors • Inaccuracies in the time of recording and the valuation of stock and flow items • Methodological errors associated with data collection or compilation procedures, e.g. sampling error, volume estimation • Non-sampling error • Seasonal adjustment and trend estimation, etc. • Statistical discrepancy • Revisions to data	• Regular source data reviews and assessments • Quality control mechanisms in place for identifying errors • Systems and methods regularly reviewed • Regular monitoring of revisions
Timeliness: the length of time between the reference period to which the information pertains, and the date on which the information becomes available.	• When data becomes available • When data are released	• Setting preannounced release dates • Monitoring of release dates • Regular reviews of timeliness
Accessibility: the ease with which statistical information can be obtained. This includes the ease with which the existence of information can be ascertained, as well as the suitability of dissemination media and costs.	• Ease with which data can be obtained • Methods of dissemination • Cost of data	• Delivery systems in line with user needs • Ready access to data for analytical purposes • Provision of search tools and advisory services • Promotion of statistics
Interpretability: the availability of supplementary information and metadata needed to interpret the information and use it correctly. This information normally covers the availability and clarity of metadata, including concepts, classifications and measures of accuracy. In addition, interpretability includes the appropriate presentation of data such that it aids in the correct interpretation of the data.	Clarity and availability of metadata	• Provision of information on concepts, classifications, methodology and quality • Interpreting data on release
Coherence: reflects the degree to which information can be successfully brought together with other statistical information within a broad analytical framework over time. Coherence covers the internal consistency of a collection as well as its comparability both over time and with other data sources.	• Relatability of key metadata - over time - with other data sources • Internally consistent	• Use of standard international frameworks, concepts and classifications • Using common frames, methodologies and systems • Data comparison and integration

THE IMF DATA QUALITY ASSESSMENT FRAMEWORK (DQAF)

The DQAF comprises a generic assessment framework and specific assessment frameworks for the main aggregates used for macro-economic analysis. The framework follows a cascading structure that flows from five main dimensions that have been identified as critical constituents of data quality. For each of these interrelated, and somewhat overlapping, dimensions, the framework identifies pointers, or observable features, that can be used in assessing quality. These pointers to quality are further

THE IMF DATA QUALITY ASSESSMENT FRAMEWORK (DQAF) *continued*

broken down into more detailed elements. At its most detailed level, for certain dimensions of quality, such as methodological soundness and accuracy and reliability, the DQAF is highly technical in nature and is designed mainly for IMF and internal assessment purposes by national accounts experts. However, at the broader level, the framework allows data users to assess data quality for their own purposes.

Recognising that the quality of individual datasets is intrinsically bound together with that of the institution producing it, the DQAF includes a few elements and indicators that, although not constituting a quality dimension in themselves, have an overarching role as prerequisites for quality. These pointers to quality cover issues such as whether a supportive legal and administrative framework is in place, whether resources are commensurate with the needs of the statistical program, and whether quality is recognised as a cornerstone of statistical work by producers of official statistics.

The DQAF defines the following dimensions of quality:

- prerequisites of quality
- assurances of integrity
- methodological soundness
- accuracy and reliability
- serviceability
- accessibility.

A feature of the DQAF is that there is a relatively close mapping to international statistical standards, such as the *System of National Accounts* (SNA93). The SNA93 manual is used as a benchmark for definitions, concepts, classifications and valuation methodologies.

In 2003, the ABS undertook a summary assessment of its national accounts program using the broad category headings of the DQAF. This assessment was published in the March quarter 2003 issue of *Australian National Accounts: National Income and Expenditure and Product* (cat. no. 5206.0) available on the ABS web site.

SECTION 4 RELEVANCE OF THE NATIONAL ACCOUNTS

INTRODUCTION

Relevance relates to the degree to which statistical information meets the real needs of users. It involves client liaison, program review, priority setting and assuring that the statistics produced together with the underlying concepts conform with international statistical standards.

CLIENT LIAISON, PRIORITY REVIEW AND PROGRAM SETTING

The ABS regularly reviews all its statistical programs to ensure that they remain relevant to user needs and to ensure that capacity is available to provide information on new and emerging issues facing policy advisors and other data users. Each year relative priorities and competing resource requirements of all programs are formally and extensively considered by senior management, generally following consultation with users. The ABS maintains a three year forward work program which is rolled forward on an annual basis. Detailed work programs are developed, resources allocated and performance indicators are established for each statistical program including the national accounts.

Ensuring ABS national accounts outputs support decision making is achieved by extensive consultation with users. This happens in a variety of formal and informal fora:

- the Australian Statistics Advisory Council
- the Economic Statistics User Group (ESUG)
- the State Accounts User Group (SAUG)
- the Productivity Measurement Reference Group
- key client manager discussions
- the Input-Output User Group
- regular contact with the Commonwealth Treasury and the Reserve Bank of Australia, particularly through quarterly seminars and discussions
- regular contact with state treasuries through quarterly seminars and discussions
- regular informal contact with other key users such as Productivity Commission and the Department of Industry, Tourism and Resources, particularly through their use of productivity data and the tourism satellite account
- the National Accounts Post SNA93 Implementation User Review
- ad-hoc meetings with academics and other experts.

A formal Information Development Plan was developed for the national accounts program in 2004. This was part of a wider ABS initiative to provide a National Statistical Service (NSS) that delivers the statistics required by key users by:

> '... agreeing on national information development plans which set out specific activities which will lead to the increased availability of data and the roles and responsibilities of key players and building effective partnerships with these players'.

CLIENT LIAISON, PRIORITY REVIEW AND PROGRAM SETTING *continued*

The major focus of the Information Development Plan for the national accounts program is on identifying important information gaps and deficiencies that cannot be immediately met from available data repositories or delivery systems and presenting directions for improving all aspects of the current statistical service.

While unmet demand for data is taken seriously, it does not mean that the ABS is currently in a position to move forward in all cases. The major area of unmet demand identified by users relates to the availability of state data, particularly quarterly GSP estimates, capital stock, multifactor productivity and input-output tables. Generally, state governments would like much the same data by state that are available for Australia. At this stage the ABS has not been able to pursue their development on the grounds of cost and expected insufficient data quality.

The Economic Statistics User Group is the key forum for seeking user views on statistical issues, emerging data needs and priorities for the national accounts and other economic statistics. It meets regularly and the membership is drawn to provide a wide-ranging representation of the economic statistics user community.

CONCEPTS, DEFINITIONS AND CLASSIFICATIONS

An important aspect of quality is that the concepts, definitions and classifications used in the body of statistics are relevant to, and understood by, users and that in order to achieve this national accounts statistics need to placed in an appropriate conceptual framework.

The framework used in the ABS in the compilation of national accounts statistics is based on the International *System of National Accounts* (SNA93). As mentioned in the Forward to the current edition (1993):

> '... The System is a comprehensive, consistent and flexible set of macro-economic accounts intended to meet the needs of government and private-sector analysts, policy makers and decision takers. ... The System has been welcomed and unanimously approved by the Statistical Commission of the United Nations'.

The various editions of the System have been developed over many years and involved the input of international organisations, national statistics agencies, academic experts and users of economic data. Moreover, it is designed as a set of accounts relevant to the analysis of economic issues. The System is reviewed and updated periodically in order to accommodate the changing structure of economies and contemporary economic issues, such as productivity measurement and the growing importance of intangible assets. An update is currently underway and is expected to be completed in 2009.

As most countries follow the SNA93 standards for national accounts statistics, broad comparisons can be made between Australia's statistics and those of other countries. The Australian system of national accounts (ASNA) is the name given to the ABS's framework of national accounts statistics.

The conceptual framework and estimation methodology for Australia's national accounts statistics are explained in *Australia's System of National Accounts, Concepts, Sources and Methods* (cat. no. 5216.0) (CSM) which was published in December 2000. Since then, a number of changes have been made as a result of the availability of new data sources or the development of new data series or improved estimation methodologies. To keep users informed, these changes are documented as they occur in the ABS

CONCEPTS, DEFINITIONS AND CLASSIFICATIONS *continued*

quarterly and annual publications, *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) and *Australian System of National Accounts*(cat. no. 5204.0) respectively. The intention for the future is to move towards a 'live' web-based version of the CSM that can be updated on a more regular basis.

The scope of the annual ASNA encompasses the full range of statistics that SNA93 recommends for a full national accounting system, including national and institutional sector balance sheets and supply and use tables. It goes beyond the core SNA accounts to provide additional data such as multifactor productivity and other analytical data including alternative measures of income. The SNA93 accounts are not followed in every detail, but these deviations are relatively minor and do not impact on major data items. Such variations are noted at appropriate points in the CSM publication. The ABS keeps these differences under review. One difference is that the ASNA does not contain a separate set of accounts for the non-profit institutions serving households sector, including them instead as part of the household sector. The ABS has chosen to provide information on non-profit institutions in a satellite account which will be updated periodically. This work should enable non-profit institutions serving households to be shown as a separate sector some time in the future.

All transactions in the ASNA are recorded on an accrual basis, as required by SNA93. This was assisted by the introduction of accrual accounting by the Commonwealth and state government jurisdictions.

The ABS places great emphasis on ensuring that its economic classifications align with SNA93 and other international standards to ensure comparability across its own economic collections and outputs as well as with those of other statistical organisations.

Standard classifications are an essential element for the compilation and presentation of statistics produced by national statistical offices. Their use ensures that statistics are comparable across industry and sector boundaries and can be aggregated from various collections. Within the conceptual framework, the ABS attempts to make the statistics as useful as possible by classifying the data in a number of ways to meet user requirements. The ASNA has a range of statistical economic classifications, including:

- Institutional sector classification
- Industry classification
- Product classification
- Functional classification
- Asset classification.

The SNA93 recognises that the core frameworks and classifications will not meet all possible needs for economic accounts data. It therefore recognised the need for 'satellite accounts' that can be used to focus on particular areas of the economy in more detail or to allow different concepts or coverage while retaining a link back to the core national accounts system. The ABS has developed a number of satellite accounts in response to user demand and cover the following topics:

- Tourism
- Information and communication technology
- Unpaid household work
- Non-profit institutions
- Energy use

CONCEPTS, DEFINITIONS AND CLASSIFICATIONS *continued*

- Distribution of household wealth
- Human capital.

For the national accounts statistics to remain as relevant as possible, resources are devoted to the development of new statistics. Research and development work is undertaken by a dedicated research unit within the national accounts program and also within the Methodology Division which also undertakes national accounts related projects. Work on special topics such as satellite accounts, volume indicators of non-market output, productivity and alternative measures of income has put the ABS close to the forefront of developments in these fields internationally. This work is continuing.

The relevance of ABS national accounts statistics is also enhanced by the frequent inclusion of feature articles on topics of interest in the quarterly and annual national accounts releases. A full list of articles is included on the ABS web site and includes topics such as the impact of the drought, the relationship between GDP and employment, accounting for the environment in the national accounts, the underground economy and GDP, long term trends in industry structure of the Australian economy and income, saving and wealth. The series of feature articles have recently been supplemented with a new web-based publication *Spotlight on the National Accounts* (cat. no. 5202.0) which is intended to introduce specific national accounts topics to a general audience.

MONITORING PERFORMANCE

Evidence that the processes described above are in place is provided by descriptions of the particular mechanisms used as described in this paper and the CSM publication. From the program perspective, evidence of periodic evaluation of the current relevance of each program can be provided and the impact of the results of these evaluations can be assessed.

Evidence of relevance is also provided by measures of usage, by client satisfaction results and by high profile examples of statistical information influencing or shedding light on important policy issues. Pointing out and publicising new analytical findings also demonstrates relevance.

As mentioned, the ABS maintains regular contact with key clients and other users of the national accounts to gauge their satisfaction with the services provided, including their views on the relevance of the data and priorities for future development. Information gleaned from these formal and informal contacts become input to the ABS priority setting processes, the outcomes of which are subject to high level management review processes.

SECTION 5 ACCURACY OF THE NATIONAL ACCOUNTS

WHAT IS MEANT BY ACCURACY

For most users, accuracy is the most sought after attribute of data. Accuracy can be defined as the proximity of an estimate to some notional true value. Because the national accounts draw data from a wide variety of sources, reflecting varying valuations, coverage, frequency, detail and timeliness, it is not possible to produce an objective overall measure of accuracy of the accounts. Instead, assessments need to be made of individual component items within the accounts. Even at this level, the use of multiple data sources in estimating a single item, their variable accuracy over time and changing compilation methods complicate the picture. As a result, assessment of the accuracy of an item requires a high degree of subjective judgement based on knowledge of the sources, the data and the compilation methods used.

In considering the quality of national accounts statistics, it can also be useful to make a distinction between the concepts of accuracy and reliability. Accuracy is the proximity of an estimate to some notional true value while reliability is the proximity of initial and intermediate estimates for a particular period to the 'final' estimate for that period. A series which is never revised is reliable, but it may not be accurate. Although reliability can be objectively measured by an analysis of revisions, it is a relative term and users are likely to have some tolerance to revisions given the trade-offs with other characteristics of quality.

In practice, at least in Australia's national accounts, accuracy and reliability tend to be interwoven and reinforcing. Ideally, as the estimate for a particular period passes through a sequence of revisions, the size of revisions gets smaller (the statistics become more reliable) and the estimate moves closer to the true value (the statistics become more accurate), but in practice this may sometimes not be the case. Revisions can be reduced by delaying the release of statistics until all or most 'final' data sources are available, but this would mean that the statistics would be less relevant to users. ABS policy is to always aim for the most accurate estimate, even though this may be at the expense of more frequent revisions. Chapter 9 of this paper provides a detailed description of the revisions process together with an analysis of the revisions history of quarterly GDP and its components. It also contains information on how the ABS proposes to make information on national accounts revisions available on a more regular basis.

By being aware of the factors that influence accuracy, judgements can be made as to the extent of error likely to be associated with an estimate. Additionally, historical analyses of the revisions that the ABS makes to its estimates of GDP and its components can provide a quantitative guide to the reliability of the statistics produced.

FACTORS AFFECTING ACCURACY

The range of factors that can influence the accuracy of the national accounts, include:

- coverage deficiencies

FACTORS AFFECTING ACCURACY *continued*

- input data errors, which include sample error and error due to the inability of data providers to report on the correct basis, mistakes in the reporting of data and error due to non-response
- error introduced during the processing of data
- methodological deficiencies
- output error due to inadequate editing and data confrontation.

COVERAGE

Except for illegal production, the scope of the Australian national accounts is exhaustive within the production boundary recommended in SNA93. Illegal activity (which relates mainly to illicit drugs) is left out of Australia's official statistics as it is difficult to measure with sufficient reliability. This is also typically the case internationally, although some countries have prepared indicative estimates.

As informal production is relatively unimportant in Australia, the ABS does not attempt to distinguish between the formal and informal sector in the sub-sectoring of the household sector. However, estimates are included for the value of owner-built construction activities and goods produced by households for own consumption such as food consumed on farms and home-grown fruit and vegetables. Unpaid housework including cooking and cleaning and volunteer services are not included, consistent with the recommendations of SNA93. However, estimates for these services have been prepared as satellite accounts.

Explicit upward adjustments are made to account for underground activity which is legal but is conducted in such a way as to avoid detection by taxation and other government authorities. The ABS recently completed a detailed review of its treatment of the underground economy in the estimation of GDP. The method used was to systemically analyse each component of GDP and make judgements as to the maximum feasible level of underground activity given available evidence from the Taxation Office and anecdotally. The results of the study were released in April 2004 in a paper titled *The Underground Economy and Australia's GDP*, which is available on the ABS web site.

The scope of some data collections may be drawn more narrowly for cost or other reasons. For example, the scope may exclude non-employing businesses, business under a certain size or some industries. A narrower scope is more likely for monthly or quarterly surveys. Data from the taxation system and other data sources allows these gaps to be filled. The annual economic collections are in fact designed around the availability of taxation data and the supplementation it brings to the coverage of small businesses including non-employing businesses. Non-profit institutions are in the main income tax exempt, so data for them has to be collected by the ABS. The annual economic survey strategy has recently been amended to improve the coverage of non-profit institutions.

The items capitalised for the first time by SNA93 relating to certain defence expenditures, mineral exploration, computer software and entertainment, literary and artistic originals have been implemented in the Australian national accounts. This resulted in an upward revision to the whole length of the series for gross fixed capital formation and GDP at the time of implementation in 1998.

INPUT DATA

The ABS undertakes a large number of collections that directly feed into the national accounts compilation process. National accounts requirements are a key consideration in the design of these surveys. Additionally, a range of non-ABS data, such as data from the taxation system, the financial institution regulation system and government financial reporting data are either integrated into the survey outputs or are used independently to compile the national accounts. As external data sources are beyond the control and responsibility of the ABS they can potentially have issues for quality assurance and measurement. This is often addressed by the ABS and the external source entering into explicit arrangements concerning roles and responsibilities of the respective agencies, questionnaire content and design, timely data and transference procedures, editing and querying protocols and appropriate feedback loops to the source agency.

The quality of ABS statistics is dependent on the application of good statistical methods during the selection and collection phases of a survey. The ABS puts substantial effort into developing standards in terms of classifications, concepts, data item definitions and question modules. All ABS surveys must use these standards. The collection instrument must be well tested and evaluated and this process is supported through documented standards in forms design, and forms evaluation.

A high proportion of information used in compiling the Australian national accounts comes from surveys that use the ABS Business Register to provide the statistical frame from which representative samples are drawn. The ABS Business Register is based on the Australian Taxation Office's Australian Business Register (ABR) which contains all businesses that have an Australian Business Number (ABN). It is expected to be comprehensive because, with very limited exceptions, businesses are required by law to obtain an ABN. The ABS has adopted a strategy of building and maintaining its own records for large and complex businesses with information for the remaining businesses sourced from the ABR. Although the ABS Business Register is comprehensive and current, there are known to be some problems with the quality of the industry coding which would have implications for the quality of the data for individual industries used in the national accounts. There have also been some issues surrounding the institutional sector coding which the ABS is in the process of improving.

Sample design and estimation systems are developed by specialist areas in accordance with internationally accepted practices. Accuracy is considered in terms of both sampling and non-sampling error. The ABS publishes information on the RSEs for its various sample surveys. These can provide an indication of the accuracy of the national accounts components to which they relate. However, because of the transformations of survey data and the aggregations that are made in order to compile the national accounts, it has not been possible to systematically calculate the impact that RSEs have on the various national accounting aggregates.

An important potential source of non-sample error can result from the inability of some data providers to report on the correct basis. The data requirements underlying the national accounts are complex and, although every effort is made to match survey data items with business accounting practices, it is inevitable that some data providers will include in their survey responses items that should not be included, and exclude items that should be included. Survey forms are tested with a small number of providers before they are approved for use. Sophisticated techniques are used to edit provider responses,

INPUT DATA *continued*

but errors can continue to go undetected. Data providers can make errors with regard to the content, timing and valuation of their transactions. Because the national accounts is a closed system, such errors can lead to inconsistencies, affecting the coherence of the accounts.

Although the ABS uses best practices in survey design and operation, given the data intensive needs of the national accounts system and the cost and respondent load imperatives that apply in survey design, it will often be the case that national accounts compilers have to make do with data that are of acceptable but less than ideal quality. This is more so for data at a finer level of detail where the standard errors are often higher. In some cases only limited detail might be collected or only collected infrequently (such as product details). Ensuring that the quality of input data is adequate to meet national accounts requirements remains an ongoing challenge. The national accounts process itself is designed to mitigate input data problems through data confrontation and balancing in the supply and use tables that are used to benchmark the national accounts (see Chapter on Coherence of the national accounts). However, good quality input data are essential to good quality national accounts data.

From time to time the ABS reviews its economic survey strategy to ensure that it meets needs within the constraints of resource availability. The national accounts requirements for data are regarded as of very high importance. The Business Statistics Innovation Program and the Annuals Integration Project are recent examples of wide-ranging reviews aimed at improving the targeting and quality of economic collections by the ABS.

METHODOLOGY

The data sources and methods used in preparing ABS national accounts statistics are regularly reviewed and periodically changes are made to the basis of compilation of an item. A major methodological improvement to the Australian national accounts was the introduction of supply and use benchmarking and annually re-weighted volume estimates in 1998. The former results in greater coherence of the accounts and the latter provides a superior measure of economic growth to the previously available volume estimates based on 5 yearly reweighting.

Seasonal adjustment methods used by the ABS are based on the United States Bureau of the Census Method II Seasonal Adjustment program, X-11 variant. Traditionally, the national accounts seasonal factors were re-analysed each September quarter and factors were fixed for the rest of the year. From the September quarter 2006 issue of the national accounts, GDP and each of its components are concurrently adjusted for seasonality, although the results will still be reviewed each September quarter. This is expected to result in a quality improvement because the method is more responsive to emerging changes in seasonal patterns.

OUTPUT DATA

As the national accounts are compiled within a comprehensive framework, it is possible to reduce the impact of data errors through the confrontation of the various estimates in the national accounts. Data confrontation is built around the conceptual relationships that exist between data items. The best known data confrontation exercise is the compilation of the annual supply and use tables. In the compilation of these tables, estimates of the supply (production) and use (demand) for commodities are compared, with differences in the initial estimates being eliminated. At the same time estimates of the value of production are compared with estimates of incomes attributable to

OUTPUT DATA *continued*

production and differences are eliminated (further details are included in chapter 8 on coherence of the national accounts).

Additional to this data confrontation exercise, each collection area is required to confront its data with other data held by the ABS and other organisations as an important part of the process of ensuring the coherence of ABS statistics. Clearance meetings are held for all the major economic collections used to compile the national accounts as a means of assuring data consistency between those collections and the national accounts, with emphasis on the most recent reference period.

The national accounts quarterly compilation process incorporates a review process designed to highlight inconsistencies and improbable data movements. Problems are identified, investigated and resolved in the process of finalising the GDP estimates. There is a feedback loop to the data collection areas, culminating in the clearance procedures mentioned above.

Over the past two years the ABS has developed quarterly supply and use (QSU) tables as an editing tool to assist in the preparation of the quarterly national accounts. Preliminary quarterly estimates for the production and income components are used as inputs to the model which generates estimates of product supply and use in a time series format. The QSU model enables inconsistencies between the different measures of GDP to be identified and investigated more systemically and at a greater level of detail than is possible by simply examining the aggregate estimates. At the present stage of its development, the QSU model is used as an aid in the compilation of the seasonally adjusted chain volume production and expenditure based estimates of GDP. The model may in the future be extended to incorporate current price estimates, including income based estimates. A description of the QSU model and how it is used is contained in the *Research Paper, A Supply and Use model for Editing the Quarterly National Accounts* (cat. no. 5258.0).

SUBJECTIVE ACCURACY RATINGS

Accuracy is concerned with the proximity of an estimate to the 'true' but unknown value of the component being measured. It is concerned with the degree of precision associated with the estimate. As already discussed, the complex nature of the national accounts makes it extremely difficult to produce a tangible benchmark against which to measure accuracy. Consequently the accuracy of the national accounts is in practice evaluated by considering the potential sources of error discussed in this Chapter and considering whether they have been minimised to the greatest extent possible. One approach that can be used to tie all the information related to data quality together is to assign subjective accuracy ratings to each series.

Subjective accuracy ratings are published by the ABS for the principal national accounts aggregates in the Concepts, Sources and Methods publication. The ratings are not derived by a particularly rigorous process, but represent an intuitive assessment by national accounts compilers. A consensus was reached taking into account knowledge about the standard errors on key survey inputs, impressions about the coverage and reliability of administrative data sources and revisions to initial estimates of growth.

SUBJECTIVE ACCURACY RATINGS *continued*

The next two tables contain an assessment for the initial quarterly estimates of movement for the current price and chain volume estimates of expenditure, income and production components of GDP. These have been chosen as they are generally the most anticipated of the national accounts estimates. Each component has been assigned one of the following grades:

A good
B fair
C poor
D very poor

SUBJECTIVE ACCURACY RATINGS *continued*

ACCURACY RATINGS, Expenditure and Income components of GDP—Initial quarterly estimates of movements

	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	C	C
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	. .
Gross operating surplus		
Non-financial corporations		
Private	A	. .
Public	B	. .
Total non-financial corporations	A	. .
Financial corporations	C	. .
General government	A	. .
Dwellings owned by persons	A	. .
Total gross operating surplus	A	. .
Gross mixed income	C	. .
Total factor income	A	. .
Taxes less subsidies on production and imports	A	. .
GDP	A	. .

. . not applicable

SUBJECTIVE ACCURACY RATINGS *continued*

ACCURACY RATINGS, Industry gross 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

THE STATISTICAL DISCREPANCIES

A more objective but still limited indicator of accuracy is provided by examining the differences between the conceptually equivalent, expenditure, production and income estimates of GDP. Quarterly GDP in the Australian national accounts is derived as the average of the three measures, with accounting balance being achieved by an explicit statistical discrepancy item for each of the three elements.

The three measures of GDP up to the year prior to the most recent complete year are balanced in annual terms using the supply and use approach. This process eliminates the statistical discrepancies in annual terms, except for the latest year. The quarterly estimates of GDP are benchmarked to the annual estimates, but within-year inconsistencies remain.

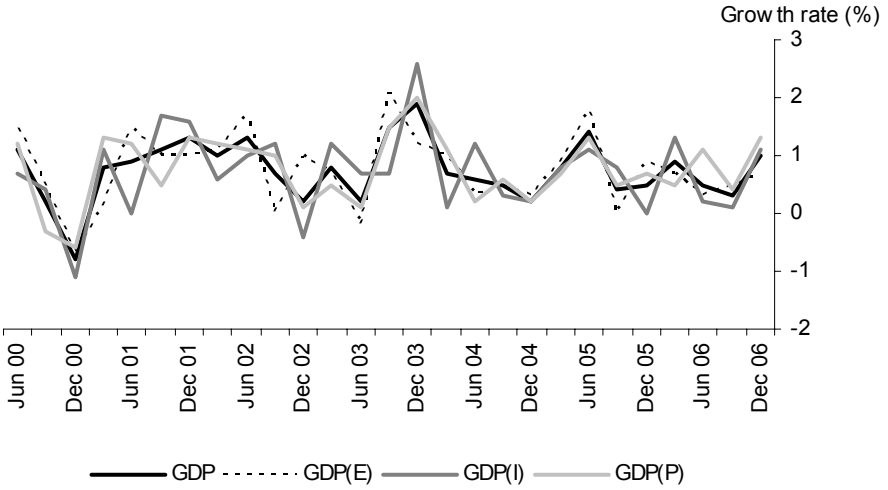
Large and persistent statistical discrepancies relative to GDP can indicate gaps in the coverage of components or other quality issues. Because the components are balanced annually in a supply and use table, the magnitude of the quarterly statistical discrepancies is small relative to the level of GDP and they cancel out over the year. Any significant data coverage issues have been addressed over time. Of more interest in the Australian context is that quarter to quarter changes in the level of the statistical discrepancies are associated with minor or more significant inconsistencies between the growth rate of GDP and its conceptually equivalent components. For this analysis, it is not necessary to examine the statistical discrepancies at all. The coherence of the data is best seen by examining the growth rates of the three components and GDP.

The graph below shows the quarterly growth rates of GDP and its expenditure, production and income components drawn from the December 2006 issue of the Australian national accounts. Over the 75 quarters from June quarter 1988, the expenditure, production and income components all moved in the same direction 80% of the time, but in 75% of quarters the disparity in growth rates between the strongest

THE STATISTICAL DISCREPANCIES *continued*

and the weakest growth component was greater than 0.5 percentage points, and in 90% of quarters it was greater than 0.3 percentage points. If only the two most consistent data items at each point in time are taken into account, as could be expected the coherence improves, as in only 30% of cases the difference is greater than 0.3 percentage points. The graph shows a more limited time series for reasons of legibility.

GDP AND ITS COMPONENTS, 2000-06



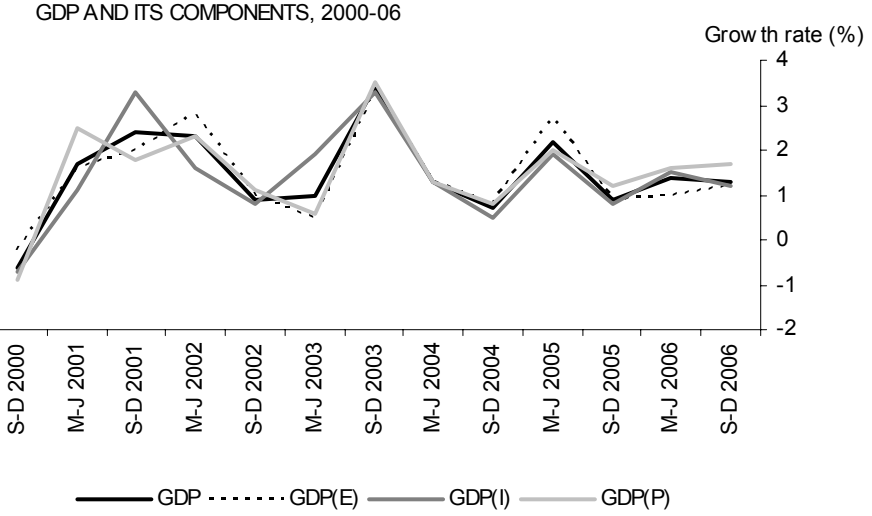
Data for recent quarters are more consistent, but this may reflect the fact that there has been less opportunity for revision of the data, especially from supply and use benchmarking. An examination of the initial estimates for each quarter shows the three GDP components to be more consistent than the revised data vintage shown below. There is a tendency for the three measures to drift as the revision process continues and this may be in part due to the procedures used to benchmark the quarterly estimates to annual data. Because of the timing uncertainties apparent in the quarterly data, users are advised to pay more attention to trend estimates and annual estimates for analysis of economic conditions, especially going back in time.

GDP, taken as the average of the three measures is a smoother series and eliminates much of this timing noise in the component data. Taking the period in the graph, GDP(P) is most highly correlated with GDP and has a correlation coefficient of 0.87. GDP(E) and GDP(I) have correlation coefficients of 0.77 and 0.78 respectively.

The timing inconsistencies are significantly reduced if six monthly rather than quarterly data are examined, as can be seen in the following graph.

THE STATISTICAL DISCREPANCIES *continued*

GDP AND ITS COMPONENTS, 2000-06



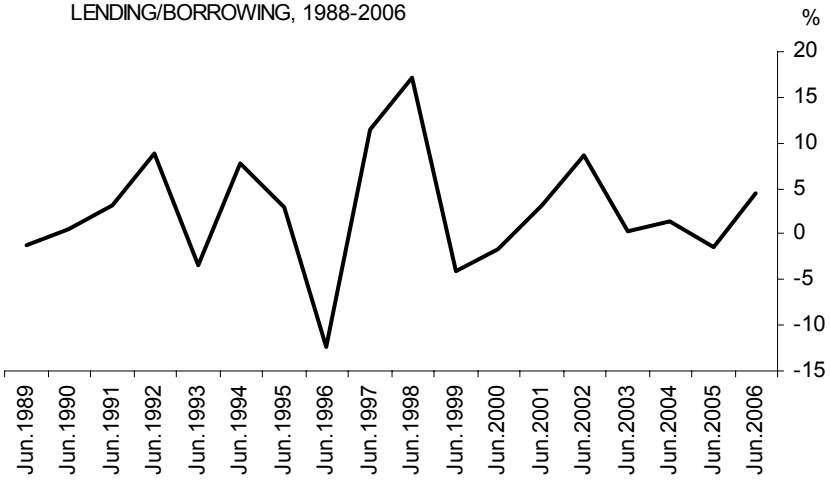
THE ERRORS AND OMISSIONS ITEM

While the statistical discrepancies between the three measures of GDP provide one indicator of the accuracy of the national accounts, the net errors and omissions item in the financial account provides another. It represents the difference between the net lending derived in the capital account and the conceptually equivalent net lending item derived in the financial account – the net errors and omissions item is required to balance them.

Net lending in the capital account is derived as a residual and reflects the expenditure, production and income components of GDP as well as other items such as net property income and net secondary income. The financial account also derives net lending as a residual but using totally independent data – it is the difference between the acquisition of financial assets and the incurrence of liabilities.

The graphs below plot the net errors and omissions item in annual terms as a percentage of net lending for the nation. Some year to year differences are evident, reflecting the difficulties inherent in measuring residuals. It reflects timing and other errors in the estimation of income, expenditure and capital flows on the one hand and financial assets, liabilities and financial flows on the other.

NET ERRORS AND OMISSIONS AS A PERCENTAGE OF NET LENDING/BORROWING, 1988-2006

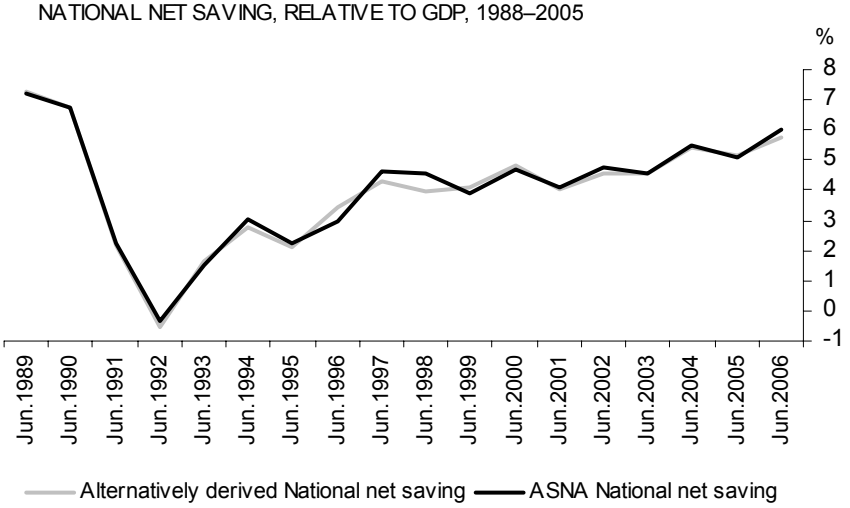


THE ERRORS AND OMISSIONS ITEM *continued*

The magnitude and volatility of the net errors and omissions item and the statistical discrepancy can also be used to indicate the quality of the saving estimates in the national accounts. National net saving is derived in the income and use of income accounts by deducting final consumption expenditure and consumption of fixed capital from gross disposable income. As it is a relatively small residual measure derived from very large aggregates its quality is particularly sensitive to inaccuracies in the series from which it is derived, and this needs to be borne in mind when using the data for analysis.

An alternative and largely independent measure of saving can be derived using acquisition of financial assets from the financial account as the starting point. Saving is a source of funds for both acquisition of financial assets and investment. The accounting relationships within the national accounts system mean that the alternative measure of saving can be calculated by deducting the net errors and omissions items and the statistical discrepancy between GDP(I) and GDP(E) from the official measure of saving. The graph below plots the official measure of annual saving and the alternative measure as a percentage of GDP. Although there are some year to year differences, the series track quite closely.

NATIONAL NET SAVING, RELATIVE TO GDP, 1988–2005



SECTION 6 TIMELINESS OF THE NATIONAL ACCOUNTS

TIMELINESS OF THE NATIONAL ACCOUNTS

The timeliness of statistical information refers to the delay between the reference period to which the information pertains and the date on which the information is made available. The timeliness of information also influences its relevance. Obviously, users want data that are as contemporary as possible.

The source data used to compile the national accounts are available with varying degrees of timeliness, frequency, accuracy and detail. Successive vintages of source data are likely to be more accurate. This is consistent with the nature of business accounting systems where sub-annual data from management information systems are updated and eventually replaced by audited annual accounts.

The ABS aims to collect the various vintages of source data as soon as satisfactory results are typically available from the respondents' own systems. These may not be final data, and in some cases businesses may not be able to respond in accordance with the set deadlines at all, resulting in an expected level of non-response. Survey systems are designed to impute values for late or non-responders. A consequence is that initial estimates are likely to be revised.

There is thus an important trade-off between the accuracy and reliability of the estimates and the timeliness of their release. To meet the decision making needs of users there is pressure to produce statistics in as timely a fashion and as frequently as possible. To the extent that complete or accurate data may not be available with the desired timing or can only be obtained at unacceptably high resource costs if at all, there will be compromises with data accuracy. Both accuracy and timeliness are characteristics of quality – the ABS relies on feedback from users as to the optimal balance between them.

The trade-off between timeliness, accuracy and detail is accommodated by way of the sequencing of releases of national accounts publications. The first published quarterly estimates are usually made available about 60–70 days after the reference period. The detailed annual estimates are released between 4 and 5 months after the reference period. The most detailed national accounts estimates relating to production, income and expenditure are contained in the input-output tables, which typically become available about 3.5 years after the reference period. Australia's national accounts rate well against those of other countries in terms of their timeliness – particularly when the level of detail made available is taken into consideration.

An OECD table, related to country announcements about the proposed release dates for the March quarter 2006 national accounts, showed quite a wide range of release dates. The Australian national accounts were released 68 days after the end of the quarter. Around half of the 30 countries in the table released their national accounts with a similar delay. 30% of countries released within 55 days or less, with Korea and the USA having the earliest release dates (25 and 28 days respectively). Countries in the euro area aim to release estimates of GDP growth around 45 days after the end of the quarter

TIMELINESS OF THE NATIONAL ACCOUNTS *continued*

followed by estimates of GDP levels around 60 days, although the latter target in particular has not always been met. The IMF Special Data Dissemination Standard requires that countries release data for GDP and major expenditure aggregates and/or by productive sector no later than 90 days after the reference quarter.

The ABS is very aware of user needs for timely national accounts data. A major limiting factor is the ability of respondents to provide data from their own systems in a timely way. A study was recently conducted to trial the impact of an earlier cut-off date for key input data. The conclusion was that it was not possible to improve the timeliness of the quarterly release without an unacceptably adverse effect on accuracy. Over time there may be some potential to make a slight improvement in timeliness by process improvement within the national accounts compilation system itself, but this has also to be balanced by the ongoing desire to extend the range of statistics that can be made available.

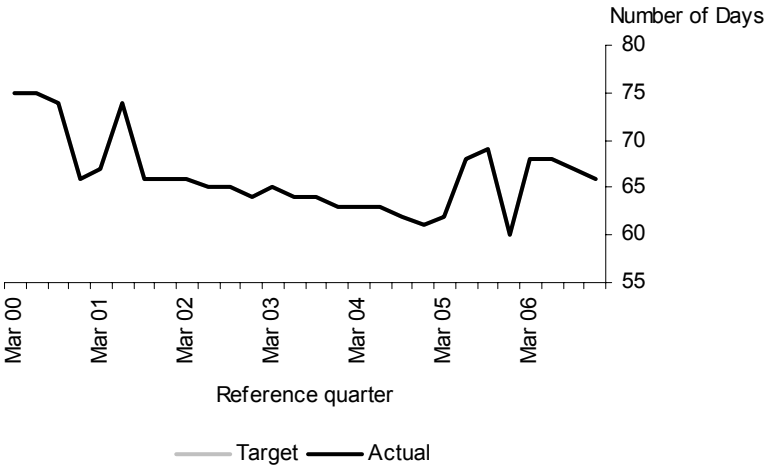
A number of countries, particularly those that release national accounts estimates early, release a preliminary issue of the quarterly national accounts followed by later 'final' estimates. The preliminary releases are often based on a partial view of the economy and require a certain amount of forecasting. For example, where monthly production indexes are available it is possible to base a preliminary estimate of quarterly production-based GDP (GDP(P)) on two months data and forecast the third month. This obviously improves the timeliness of the national accounts as they can be released soon after the end of the quarter, although the preliminary releases are normally issued with caveats. The ABS has not chosen this approach, and monthly production indexes are not compiled that would enable this approach to be used.

On the annual source data side there are prospects for improvements to the timeliness of data that can be used for benchmarking preliminary estimates due to the implementation of the Business Statistics Innovation Program and the Annuals Integrated Collection Strategy. This may not result in more timely national accounts, but more accurate and cost effective national accounts.

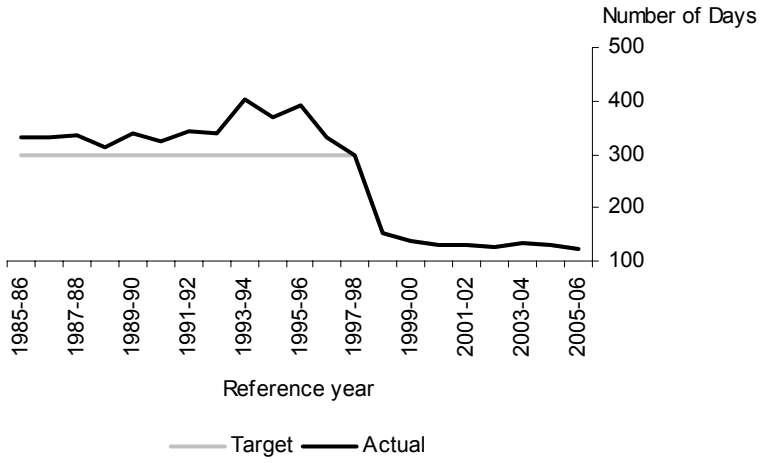
The number of days between the end of the reference period and the release date is shown in the following graphs. There has been a marked improvement in the timeliness of the annual and state releases. Where the target line is not displayed, it is the same as the actual.

TIMELINESS OF THE NATIONAL ACCOUNTS *continued*

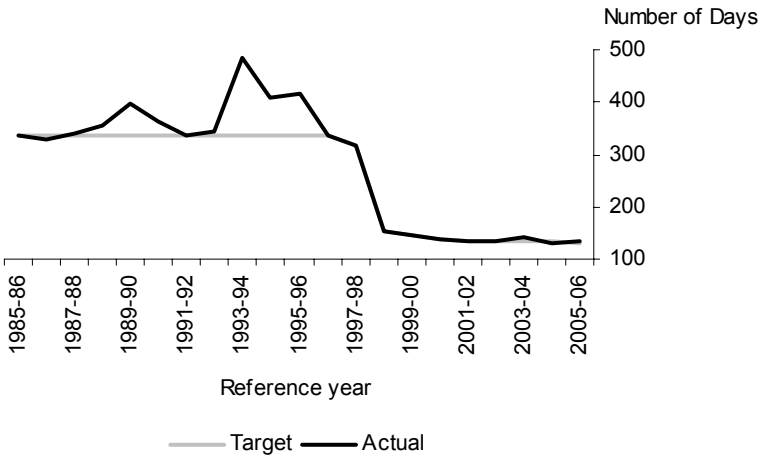
ANA: NATIONAL INCOME, EXPENDITURE AND PRODUCT, 5206.0



AUSTRALIAN SYSTEM OF NATIONAL ACCOUNTS, 5204.0

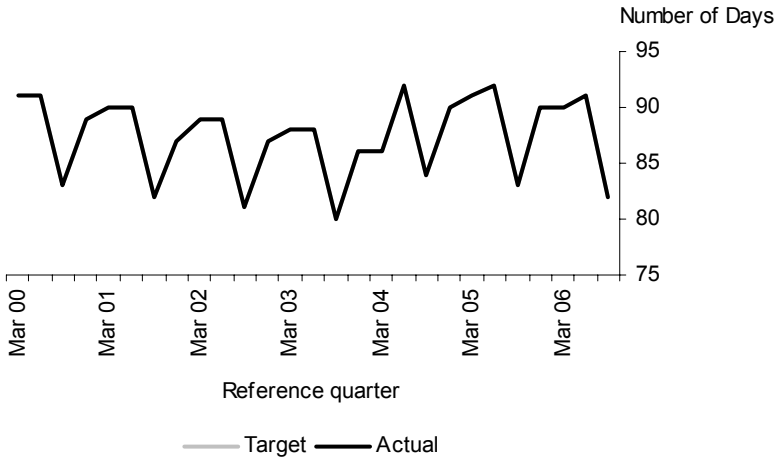


ANA: STATE ACCOUNTS, 5220.0



TIMELINESS OF THE NATIONAL ACCOUNTS *continued*

ANA: FINANCIAL ACCOUNTS, 5232.0



SECTION 7 ACCESSIBILITY OF THE NATIONAL ACCOUNTS

ACCESSIBILITY OF THE NATIONAL ACCOUNTS

Accessibility of information refers to the ease with which users can learn of its existence, locate it, and import it into their own working environment. Aspects covered include data availability, metadata availability (i.e. information about the data) and the degree of interpretative assistance available to users of the data. Data availability involves issues of data presentation, distribution media as well as the availability of non-confidential but unpublished data. Metadata availability concerns the availability of information concerning the concepts, sources and methods associated with the data. Accessibility also considers whether the information surrounding or supporting the data is openly available to the public.

Most aspects of accessibility in the ABS are determined by agency wide dissemination policies and delivery systems. At the program level, the main responsibility is to choose appropriate delivery systems and ensure that statistical products are properly included within corporate catalogue systems.

Accessing the data

The ABS provides users with ready access to national accounts statistics. Paper publications have now largely given away to a variety of electronic releases which are now the preferred way of accessing statistical information. Everything on the ABS website is free and this includes all standard releases of national accounts information.

A national accounts theme page on the ABS website lists all the quarterly and annual national accounts datasets currently available. It also provides an extensive range of national accounts information including access to the latest national accounts data. Principle results are highlighted.

The regular national accounts outputs are:

- the quarterly publication *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0)
- the quarterly publication *Australian National Accounts: Financial Accounts* (cat. no. 5232.0)
- the annual publication *Australian System of National Accounts* (cat. no. 5204.0)
- the annual publication *Australian National Accounts: State Accounts* (cat. no. 5220.0)
- the annual publication *Australian National Accounts: Tourism Satellite Account* (cat. no. 5249.0)
- the periodic publication *Australian National Accounts: Input-Output Tables* (Product Details) (cat. no. 5209.0.55.001)
- the periodic publication *Australian National Accounts: Non-profit Institutions Satellite Account* (cat. no. 5256.0)
- the periodic publication *Spotlight on National Accounts* (cat. no. 5202.0).

Accessing the data continued

Information about the full range of national accounts and other ABS publications is available in the *Catalogue of Publications and Products* (cat. no. 1101.0).

Users requiring more detail than that provided in the standard national accounts releases can seek information on request and, subject to cost-recovery charges, the information will be provided if it is available and of sufficient quality.

Accessing the metadata

The ABS has a range of ways of providing users with information about national accounts data. The *Australian National Accounts: Concepts, Sources and Methods* (CSM) (cat. no. 5216.0) publication outlines the major concepts and definitions, describes the data sources and methods used to prepare the estimates and provides information about the ways in which the relevant international concepts and standards have been implemented in Australia. It also discusses the accuracy and reliability of national accounting concepts and estimates. The publication is available from the ABS website or on CD-ROM.

The front pages of each publication contain key results. Information is included about future releases and about any changes in the issue. Main features describe the major elements of the data, the tables and graphs contain footnotes to alert users to revisions and other relevant issues that impact the data series. The final pages of both the quarterly and annual publications contain 'Explanatory Notes' and a 'Glossary' which describe in detail scope and coverage, data item definitions and classifications and comments on the accuracy of estimates.

Information about releases

Release dates of national accounts publications are announced well in advance, both in the national accounts publications and in general ABS release advices. The ABS website also provides information about upcoming releases.

In releasing statistics, the ABS adheres to long established principles that results of statistical collections should be made available as soon as practicable and should be available to all users at the same time, although the ABS will consider giving very limited pre-release access for the purpose of briefing a Minister. An embargo is placed on the release of statistics until 11.30 am (Canberra time) on the designated day of release. There are strict security procedures to ensure that there is no unauthorised access of statistics prior to release.

Consulting with users

Users are routinely consulted regarding their data requirements and how they would like to see the data presented in publications and electronic media. In response to various user comments, the quarterly publication *Australian National Accounts: National Income, Expenditure and Product* was redesigned in 2004 to better present key data items and to make the publication more user friendly.

Assistance to users

In accordance with ABS policy, each national accounts publication contains an inquiries box on its front cover which explicitly names a person who can be approached for further information or assistance. The contact officers named are subject matter experts in the National Accounts Branch of the ABS.

Assistance to users continued

Additionally, the ABS national information and referral service provides a free, quick reference information service to queries received from the community via telephone, email, letter and fax.

SECTION 8 INTERPRETABILITY OF THE NATIONAL ACCOUNTS

INTERPRETABILITY OF THE NATIONAL ACCOUNTS

To make appropriate use of statistical information users need to understand the properties of the information. That requires the provision of descriptions of the underlying concepts, variables and classifications that have been used, the methods of collection, processing and estimation used in producing the information and an assessment of the accuracy of the information.

Statistical information that users cannot understand, or can easily misunderstand, has no value and may have negative value. Providing sufficient information to allow users to properly interpret statistical information is therefore essential. Information about information is technically known as metadata. Managing interpretability is primarily concerned with the provision of metadata.

The information needed to understand statistical data falls under three broad headings:

- the concepts, definitions and classifications that underlie the data
- the methodology used to collect and compile the data
- indicators of accuracy of the data.

The description of methodology also serves as a surrogate indicator of accuracy – it allows users to assess suitability for purpose.

There are close relationships between these three headings and other dimensions of quality. The underlying concepts and classifications used are also a prime determinant of coherence (see next section) and the degree to which they conform with national and international standards should be apparent from the metadata.

The CSM publication defines and discusses the major concepts, definitions and classifications that underlie national accounts data estimates. It also describes the methodology used to transform input data into statistical outputs and discusses the accuracy and reliability of national accounting estimates. The Australian national accounts concepts, classifications and terminology follow closely those of the SNA and therefore, users can be confident that they can draw valid comparisons with national accounts data produced by other countries.

Supplementing and updating this publication are an assortment of information papers, working papers and feature articles which draw attention to issues impacting on the data such as changes to the classifications, systems, concepts or standards, major data revisions and changes in data dissemination practices. Feature articles and technical notes are written on a regular basis to inform users of emerging issues and methodological changes and their impact on the national accounts. Most commonly, feature articles and technical notes are released in the national accounts publications, but *Australian Economic Indicators* (cat. no. 1350.0) has also been used. Information papers and research papers report on various aspects of research undertaken on topics

INTERPRETABILITY OF THE NATIONAL ACCOUNTS *continued*

relevant to the national accounts. A list of feature articles is maintained in the national accounts theme page on the ABS website.

This current Information Paper is an important addition to the information available to help users to interpret the national accounts.

SECTION 9 COHERENCE OF THE NATIONAL ACCOUNTS

COHERENCE OF THE NATIONAL ACCOUNTS

Coherence of statistical data includes coherence between different data items pertaining to the same point in time, coherence between the same data item for different points in time, and international coherence.

By being aware of the factors that influence coherence, judgements can be made as to the extent of error that might be associated with an estimate. These judgements can be enhanced by comparing estimates that conceptually should be identical, or by comparing estimates where a particular relationship between the estimates could be expected. In other words, the extent to which a set of statistics are coherent can provide a guide to the accuracy of the statistics. However, it should be noted that a coherent set of statistics is not necessarily an accurate set, as the statistics that are being compared may suffer from similar magnitudes of error with the errors being in the same direction.

Users are sometimes faced with utilising different sets of statistical information derived from different sources and at different times. Appropriate use is facilitated if information can be validly compared with other related data sets. This is achieved through the use of common, or at least comparable, concepts and methodologies across products. The tools for managing coherence fall under three broad headings.

Standard frameworks, concepts, variables and classifications

These aim to ensure that the target of measurement is consistent across statistical programs, that consistent terminology is used across programs and that the qualities being estimated bear known relationships to each other. The realisation of this element is normally through the adoption and use of frameworks such as the SNA and the ASNA. The issue of international comparability is addressed by considering the adherence of the standards adopted to the international standards as contained in the SNA.

Although there are a wide range of uses for economic data, national accounts data requirements are a key guiding principle behind most of the ABS's economic collections. Coherence has been aided by the harmonisation of the various international standards for economic statistics with the SNA. Where administrative data are used, special care is taken to ensure the correct application of standards and the identification of possible data gaps and overlaps. Where administrative data are known to differ from national accounts standards, appropriate adjustments are made to align the data.

Common frames, methodologies and systems

The development and use of common frames, methodologies and systems for data collection and processing contribute to data coherence. For example, the use of a common business register across all business surveys ensures that differences in frame coverage do not introduce inconsistencies in data; the use of commonly formulated questions when the same variables are being collected in different surveys serves to minimise differences due to response error; the use of common methodology and systems for the various processing steps of a survey helps to ensure that these operations do not introduce discrepancies in data.

DATA COMPARISON AND INTEGRATION

The confrontation of data from different sources and the subsequent reconciliation is a key part of the national accounts process. At its most formal, this process occurs in the annual balancing of the supply and use tables which are used to benchmark the national accounts. It also includes the coherence between the national accounts estimates and the various partial indicators of economic activity that are published by the ABS and outside (where applicable).

Supply and use tables are conventionally presented as two tables, a supply table showing the supply of products from domestic production and imports, and a use table showing the intermediate use of these same products by industry and final use by type of expenditure. A complete use table also includes the primary inputs to production, namely compensation of employees, operating surplus and other taxes less subsidies on production. The balancing of the supply and use tables ensures that final domestic expenditure, intermediate use and exports are consistent with the supply of products from domestic output and imports. It also ensures that the incomes and gross value added of each industry are the same. In turn, this ensures that the three approaches to measuring GDP will produce estimates of equal value as they are drawn from aggregates in the supply and use table.

The tables below illustrate the basic structure of supply and use tables.

	Output of industries at basic prices (1)			**Imports** (2)	**Total supply at basic prices** (3)=(1)+(2)	**Trade and transport margins** (4)	**Taxes less subsidies on products** (5)	**Total supply at purchasers' prices** (6)=(3)+(4)+(5)
	Industry A	Industry B	Industry C					
Product A								
Product B								
Product C								
Product D								
Total supply								

	Intermediate use by industries			Total intermediate use	Final expenditure	Exports	Change in inventories	Total use of products at purchasers' prices
	Industry A	Industry B	Industry C					
Product A								
Product B								
Product C								
Product D								
Total use at purchasers' prices								
Compensation of employees								
Gross operating surplus								
Other taxes less subsidies								
Industry output at basic prices								

DATA COMPARISON AND INTEGRATION *continued*

The confrontation of data in this framework provides a systematic, if somewhat complex, means of checking the coherence of much of the source data used in the national accounts. In the process the source data are subject to examination and adjustment to achieve coherence in the national accounts statistics. While coherence is achieved, it cannot be claimed that the results are necessarily accurate. Supply and use tables are data intensive and some product information has to be synthesised. Later and more suitable source data may become available that leads the national accounts compiler to take different decisions to balance the supply and use of products. The balancing process itself also has some limitations because it is not possible to thoroughly assess every imbalance. However, it can be expected that any significant inconsistencies in major data items will become apparent in the balancing process. Despite some limitations, the supply and use methodology is recognised internationally as the best means of checking the coherence of data and assuring the accuracy of the national accounts.

The Australian national accounts are balanced to annual supply and use tables from 1994–95 through to the year prior to the latest complete year. Quarterly estimates are not formally compiled in a supply and use framework, and therefore the three approaches to measuring GDP will produce different results on a quarterly basis. A single headline measure of quarterly GDP in Australia is obtained by averaging the three measures.

DATA COMPARISON AND INTEGRATION *continued*

Although no attempt is made to completely balance quarterly data, considerable attention is given to confronting the consistency of the data used to compile the quarterly accounts. The ABS has developed a quarterly supply and use model to help identify internal inconsistencies and to help focus investigations by the national accounts compilers. However, timing and other inconsistencies in the data still remain after this process, and are reflected in the statistical discrepancies that are shown explicitly in the Australian national accounts. However, as previously mentioned, the statistical discrepancies are only a partial measure of coherence in the data – they represent an aggregation of all the positive and negative discrepancies implicit in the large amount of source data that are used to compile quarterly GDP.

The other aspect of coherence relates to the consistency of the national accounts with other economic data published by the ABS and other organisations. The ABS publishes a large amount of data on various aspects of the economy. To the extent that many of these are also inputs to the national accounts it could be expected that they would be coherent with the national accounts. Processes have been implemented to achieve as much consistency as possible. Representatives of the economic collections and economic accounts areas meet formally and regularly to discuss and come to agreement on the statistical treatment and dimensions of recent economic events such as privatisations, major construction and resource projects, asset purchases and other issues surrounding the reconciliation of economic data more generally.

A formal process has also been established to involve national accounts staff in the clearance of some quarterly economic indicator surveys that are published before the national accounts. This gives the national accountants an opportunity to ask questions and input any additional information gained from the wider perspective of other data available for the wider economy prior to finalisation of the results. As a result of this formal process the national accounts and the partial indicators data for recent quarters should be consistent, although some scope, concepts and other differences may mean that they are not exactly equal. As time goes by, the benchmarking procedures applied to the national accounts may lead to divergence with the sub-annual partial indicator statistics.

There have been a few occasions where officials and economic commentators have questioned the consistency between the national accounts and other economic data. In particular, the relationship between employment growth and output growth as measured by GDP is complex, and the data series can occasionally move in directions that appear counterintuitive. The ABS has undertaken an investigation into the relationship between GDP and employment, see the June 2005 release of *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) for more detail. The relationship between GDP growth and growth in tax revenues has also been raised. On this latter point, it should be noted that there are many differences between operating surplus from the national accounts and taxable income. For example, taxable income includes realised capital gains but deducts net interest payments. Operating surplus excludes capital gains and losses and does not deduct net interest payments. The treatment of these elements can result in different year to year movements and also in the longer term growth.

SECTION 10 REVISIONS TO THE NATIONAL ACCOUNTS

INTRODUCTION

Revisions in relation to the national accounts may be defined as the differences between a published sequence of estimates for a given reference period for the same national accounting variable over a particular period of time. Revisions arise from the progressive incorporation of more up to date data, re-weighting of chain volume series and reassessment of seasonal factors, and from time-to-time the introduction of new accounting concepts and improved data sources and methods.

Revisions analysis is concerned with the reliability of initial (or subsequent) estimates rather than the accuracy of estimates. Accuracy is always the main focus of statistical agencies. However, as mentioned earlier in this paper, a standard accuracy measure, such as the standard error of GDP, has been found impossible to produce in practice because of the complicated compiling process and aggregation structure of the national accounts. For example, a Eurostat (1999) task force concluded that:

> "even under the most optimistic assumption that confidence intervals can be provided for all basic sources, objective error margins for national accounts aggregates appear to be out of reach. The problems posed by identifying, measuring and aggregating all errors that remain after adjustments are made at the various compilation stages seem insurmountable."

Reliability refers to the ability of the successive vintages of national accounts estimates to present a consistent, reliable picture of the economy as the estimates are revised to incorporate increasingly comprehensive and improved source data. Therefore, reliability is a relative measure rather than an absolute measure like a standard error. Revisions analysis is often employed as a diagnostic tool to indicate possible sources of unreliability, but the results should never to be used as an adjustment factor in compiling or interpreting the national accounts.

Revisions should not be see as synonymous with error. Revisions are an inevitable consequence of the national accounts process, reflecting both the complexity of economic measurement and the need to provide economic policy advisers and other users with initial estimates that are timely in order to maximise their use in analysis of current economic conditions. While the trade-off between timeliness and accuracy/reliability is a major reasons for revisions to initial estimates, delaying the release of data by a year or more would not mean that revisions are no longer required. There are several reasons for this:

- Unlike in business accounting, where the aim is to record accurately the transactions and financial position of a particular business entity in isolation, the national accounts process is aimed at bringing together sets of accounts that are coherent for the whole nation. It is in effect a quadruple accounting system, and achieving coherence between the transactions of economic agents is an iterative process proceeding over a number of years.

INTRODUCTION *continued*

- Some of the most complete data are only available every few years (such as the Census of Population and Housing).
- To make the national accounts more useful for economic analysis the data are subject to transformations to produce seasonally adjusted and trend estimates. The ABS uses X-11 methodology to estimate seasonal factors. This is essentially a model based process that relies on seasonal patterns established over a number of years and the estimation of forward (projecting) factors. As new quarters are added and previous quarters are revised the seasonal patterns and trend-cycle component (hereafter referred to as trend) are re-estimated and depending on specifications of the model can effect the estimates for a number of years. These estimations are subject to revision, particularly in real time as a result of so-called end-point problems that are endemic to filters used to estimate seasonal factors and trend.
- Where possible, improvements to data sources and estimation methods, as well as occasional changes to national accounting standards are backcast to earlier periods.

ABS and international data quality assessment frameworks include revisions history as one of the indicators of quality, linking it with the accuracy element. Users need to be aware of the potential for revisions, and to satisfy themselves that initial estimates provide an acceptable indication of later estimates that are based on more complete data that has been subjected to coherence checks within the national accounts system. As part of an overall quality assessment program, national accounts compilers are encouraged to regularly conduct an analysis of revisions in order to inform users and to help guide the continuous quality improvement process within statistics agencies.

The ABS has published studies of revisions in the past, as have a number of other national statistics agencies. However, more recently, the OECD have observed that most producers of economic statistics do not quantify revisions to their data. This has motivated them to establish the freely available 'Main Economic Indicators Original Release Data and Revisions Data Base' for a limited number of key economic statistics together with an analytical spreadsheet. This is designed to assist compilers of statistics and analysts to derive a standard set of revisions measures using either OECD data or their own data. This should also facilitate international comparisons of revisions.

The remainder of this section describes: the national accounts compilation process and revisions policy; the development of an infrastructure for the regular analysis of revisions; and presents the results of a recent study into revisions to the quarterly national accounts.

THE NATIONAL ACCOUNTS COMPILATION PROCESS

The ABS has in place a set of rules to manage the timing of revisions to the national accounts. It is based around the national accounts compilation process, which itself reflects the availability of new or revised source data as well as operational factors.

While the basic accounting and price index data from the quarterly surveys can normally be expected to become quite firm the quarter following the initial estimate, the national accounts process requires that the estimates derived from these sources be subject to annual benchmarking that proceeds on a regular basis. The results of the benchmarking process are first published in the September quarter issue of the quarterly national accounts, coinciding with the availability of balanced annual current price and volume data from the supply and use tables.

THE NATIONAL ACCOUNTS COMPILATION PROCESS *continued*

The supply and use system progressively incorporates business accounts and other data from ABS annual surveys and from the taxation system. A balancing process is undertaken to achieve consistency between the supply and use of products in the economy in current price and volume terms. Data inconsistencies are reviewed and have to be resolved by altering some of the basic data. Quarterly national accounts estimates are benchmarked to successive vintages of annual data to maintain consistency within the national accounts system. This process also introduces revisions to quarterly growth rates in years either side of the new or revised annual data.

The benchmarking procedure used by the ABS is a mathematical routine designed to equate the quarterly and annual benchmarked estimates while minimising the impacts on existing quarterly growth rates. Using this procedure, revisions to an annual estimate have the potential to impact on growth rates for all the quarters in that year and in the two previous years and two forward years. Impacts of benchmarking on individual quarter growth rates could be reduced by adopting a simple pro rata procedure, but this would force all of the revision to growth rates into the September quarter. The optimising procedure used is widely considered to produce superior estimates of quarterly growth rates, but at the expense of more widespread revisions. Revisions to annual estimates result from the progressive incorporation of more complete source data balanced in the supply and use system and revisions to quarterly estimates result from the process of benchmarking. In this way a revisions process is inherent within the national accounts process because more comprehensive and reliable data only become available with a considerable lag.

Typically, the national accounts process for a given quarter for original current price and volume data proceeds as follows:

- The initial quarterly estimate is based on preliminary quarterly survey data.
- The later vintage quarterly estimates up to the June quarter issue of the national accounts are based on more complete or 'final' quarterly survey data.
- At the end of the current financial year (June quarter) the annual estimates for that year are derived initially as the sum of the four quarters.
- In the September quarter the reference year values for the whole time series of chain volume estimates are advanced one year to the current price values applying in the previous financial year. Re-referencing impacts on the data levels, but not on the growth rates. The base year weights for the current and previous year chain volume estimates are also moved forward. This can result in a revision to growth rates in those years.
- In the September quarter the quarterly estimates are subject to a benchmarking process to align them with annual current price and volume data that has been balanced in the supply and use system.

Seasonally adjusted estimates are created by applying seasonal factors to the unadjusted/original current price and chain volume data. Trend estimates are obtained by removing the irregular component from the seasonally adjusted series. This transformation to seasonally adjusted and trend data is a modelling process where the addition of new quarters and data revisions to previous quarters results in a re-estimation of the seasonal factors and underlying trends in the data going back a number of years due to the end-point problem. Revisions to growth rates will result from this process. Seasonal reanalysis of the data series was traditionally undertaken each September

THE NATIONAL ACCOUNTS COMPILATION PROCESS *continued*

quarter which meant that revisions to seasonal factors generally only occurred once a year, although on occasion a 'one-off' reanalysis was conducted if evidence of changing seasonality had emerged. However, the ABS introduced concurrent seasonal adjustment to GDP and its component series from the December 2006 quarter issue of the national accounts. This involves re-estimating seasonal factors for the whole time series with the addition of each new quarter and therefore, revisions potentially flow through with the addition of each new quarter. Overall, the use of concurrent seasonal adjustment is expected to improve the accuracy and the consistency of the seasonally adjusted series by reducing the reliance on outdated projected forward seasonal factors. Annual seasonal re-analysis will still be required but it is expected that it will not result in significant revisions to the seasonal factors that have been derived concurrently.

REVISIONS POLICY

As a consequence of this process, in normal circumstances the following revisions policy applies for GDP and components.

The September quarter releases normally allow up to 16 quarters of revision (i.e. the quarters of the current year plus the quarters of the previous three financial years) for original current price and chain volume estimates. In these issues, updated annual supply and use benchmarks will be introduced.

In other quarter releases revisions to original current price (and chain volume) estimates are restricted to the current year and the previous financial year.

For chain volume and price measures, the annual re-referencing of the series each September quarter will cause revisions to the levels for the entire series. Re-referencing does not affect percentage movements, but the introduction of updated price weights for the most recent periods could affect growth rates for these periods.

Revisions resulting from seasonal re-analysis are allowed to flow through to the whole seasonally adjusted time series at the time the seasonal reanalysis is undertaken. Traditionally, this occurred in the September quarter release of the national accounts, but with the introduction of concurrent seasonal adjustment, revisions to seasonal factors occur each quarter. GDP and all components were subject to concurrent seasonal adjustment from the September 2006 quarter issue of the national accounts.

From time to time the ABS will also implement an 'historical revision' outside of the normal cycle where the whole historical time series is opened up for revision. Because there has been a number of significant statistical developments in recent years (such as those flowing from the introduction of the new tax system in Australia) there have been three historical revisions since the introduction of supply and use benchmarking in 1997–98.

AVAILABILITY OF INFORMATION ON REVISIONS

At present, the following indicative information is provided:

- *Australian National Accounts: National Income, Expenditure and Product* (cat. no. 5206.0) – Tables detail revisions to the recent eight quarters for GDP and its expenditure, income and industry components. Additionally, the publication contains commentary in the 'Analysis and comments' section on major sources of revisions. Finally, the explanatory notes provide some discussion of the sources of revisions and the accuracy of the estimates more generally.

AVAILABILITY OF INFORMATION ON REVISIONS *continued*

- *Australian System of National Accounts* (cat. no. 5204.0) – The major sources of revisions are documented within the 'Analysis of results' section.
- Occasionally, more detailed studies have been made available.

The ABS has recently reviewed its strategy for the analysis of revisions to the national accounts and has decided to formalise a process to undertake regular revisions analysis and to make the results available to users. This is in keeping with developing ABS thinking about data quality declarations more generally for its statistical outputs. The strategy for the national accounts revisions related data is described below.

(1) Real-time database of national accounts data

So called real-time databases, also referred to as data-triangles, show how a given (published) estimate for a particular period progresses over time. One axis of the triangle shows the various publication dates and the other axis shows the reference period. Initial estimates for each quarter are shown along the diagonal. A data triangle containing limited vintages of growth percentage change data together with a derived triangle showing quarter to quarter revisions in percentage points are illustrated below.

Real-time databases can be time consuming to produce initially because they involve assembling a large amount of historical data that may or may not be stored electronically. However, it is a prerequisite for systematic studies of revisions.

GDP GROWTH RATES, Chain volume measures—Seasonally adjusted—2003 –2006

	MQ03	*JQ03*	*SQ03*	*DQ03*	*MQ04*	*JQ04*	*SQ04*	*DQ04*	*MQ05*	*JQ05*	*SQ05*	*DQ03*	*MQ06*	*JQ06*	*SQ06*	*DQ06*
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Mar 03	0.7	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Jun 03	0.6	0.1	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Sep 03	0.7	0.3	1.2	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Dec 03	0.9	0.3	1.3	1.4	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Mar 04	0.9	0.3	1.4	1.3	0.2	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Jun 04	0.8	0.2	1.6	1.3	0.5	0.6	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Sep 04	0.8	0.4	1.7	1.5	0.5	0.8	0.3	. .	. .	. .	. .	. .	. .	. .	. .	. .
Dec 04	0.7	0.4	1.7	1.6	0.4	0.7	0.2	0.1	. .	. .	. .	. .	. .	. .	. .	. .
Mar 05	0.7	0.4	1.7	1.7	0.3	0.7	0.2	0.3	0.7	. .	. .	. .	. .	. .	. .	. .
Jun 05	0.8	0.2	1.7	1.6	0.4	0.6	0.4	0.3	0.5	1.3	. .	. .	. .	. .	. .	. .
Sep 05	0.9	0.1	1.6	1.8	0.7	0.5	0.2	0.4	0.7	1.3	0.2	. .	. .	. .	. .	. .
Dec 05	0.9	0.1	1.7	1.6	0.8	0.5	0.4	0.3	0.7	1.3	0.3	0.5	. .	. .	. .	. .
Mar 06	0.9	—	1.7	1.7	0.7	0.5	0.4	0.4	0.7	1.2	0.3	0.7	0.9	. .	. .	. .
Jun 06	0.9	—	1.7	1.7	0.7	0.4	0.5	0.5	0.7	1.3	0.4	0.5	0.7	0.3	. .	. .
Sep 06	0.7	0.2	1.5	2.0	0.6	0.5	0.5	0.4	0.6	1.5	0.4	0.8	0.6	0.5	0.3	. .
Dec 06	0.8	0.2	1.5	1.9	0.7	0.6	0.5	0.2	0.8	1.4	0.4	0.5	0.9	0.5	0.3	1.0

. . not applicable — nil or rounded to zero (including null cells)

GDP GROWTH RATES, Chain volume measures—Quarter to quarter revisions: **Seasonally adjusted**—2003 –2006

	MQ03	*JQ03*	*SQ03*	*DQ03*	*MQ04*	*JQ04*	*SQ04*	*DQ04*	*MQ05*	*JQ05*	*SQ05*	*DQ03*	*MQ06*	*JQ06*	*SQ06*
	% pts	% pts	% pts	% pts	% pts	% pts	% pts	% pts	% pts	% pts	% pts	% pts	% pts	% pts	% pts
Jun 03	–0.1	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Sep 03	0.1	0.2	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Dec 03	0.2	—	0.2	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Mar 04	—	—	—	–0.1	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Jun 04	—	–0.2	0.3	0.1	0.3	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Sep 04	–0.1	0.2	0.1	0.1	—	0.2	. .	. .	. .	. .	. .	. .	. .	. .	. .
Dec 04	–0.1	0.1	—	0.1	–0.1	—	–0.1	. .	. .	. .	. .	. .	. .	. .	. .
Mar 05	—	—	—	0.1	—	–0.1	—	0.1	. .	. .	. .	. .	. .	. .	. .
Jun 05	0.1	–0.2	0.1	–0.1	0.1	–0.1	0.2	—	–0.2	. .	. .	. .	. .	. .	. .
Sep 05	—	–0.2	–0.2	0.2	0.3	–0.1	–0.2	—	0.2	—	. .	. .	. .	. .	. .
Dec 05	—	—	0.1	–0.1	0.1	0.1	0.1	–0.1	—	—	0.1	. .	. .	. .	. .
Mar 06	—	—	—	—	—	–0.1	—	0.1	—	—	—	0.2	. .	. .	. .
Jun 06	—	—	—	—	—	—	0.1	0.1	—	0.1	0.1	–0.2	–0.2	. .	. .
Sep 06	–0.2	0.2	–0.2	0.3	–0.1	0.1	—	—	–0.1	0.2	—	0.2	–0.1	0.2	. .
Dec 06	0.1	—	—	–0.1	0.1	0.1	—	–0.2	0.2	–0.1	—	–0.3	0.3	—	—

. . not applicable — nil or rounded to zero (including null cells)

(1) Real-time database of national accounts data continued

The ABS had built a real-time data base for a number of the national accounts series for a study that was conducted in the late 1990s. It has been updated on an informal basis since then. A drawback was that it was not integrated into the national accounts output environment and therefore operated as a stand alone system. The ABS is now in the final stages of a project to construct a real-time database incorporating these and later vintages of data on a FAME platform to facilitate the production of revisions statistics and for release in its own right. The database will be updated every time a new issue of the quarterly national accounts is released and it can be made available to users on request.

As already mentioned above, the OECD has recently developed a real time data base for main economic indicators, including chain volume, seasonally adjusted GDP and its expenditure components. The data triangles and associated analytical programs and user guide are freely available on the OECD website. The ABS real-time data base is designed to be compatible with the OECD analytical programs. Users who may want to undertake their own analysis of Australian national accounts data may wish to make use of the OECD analytical spreadsheets.

There are several reasons why users are interested in having access to a real-time data base. Because of the sheer number of data series and vintages in the national accounts, standard revisions analyses such as the one presented at the end of this section represent more of an overview rather than an in-depth analysis. While this is valuable in itself, users can gain further insights if they have the flexibility to look at particular time periods, or the sequence of revisions for a particular initial estimate or data item of interest. Real-time data bases also provide analysts with data they can use to test the sensitivity of economic models to potential revisions in input data. This involves testing econometric models in simulated real time to give a better reflection of how the models might perform in practice using first published estimates.

(2) Ongoing public release of revisions data for selected series

The ABS is planning to make available revisions triangles and revisions statistics for the latest 20 quarterly observations of the growth rate for a few key national accounts series on an ongoing basis. These would be provided on the web shortly after the release of the quarterly national accounts. The data will complement the information on revisions already provided in the quarterly release.

(3) Comprehensive revisions analysis to be undertaken on a less frequent basis

A less frequent, more comprehensive analysis will be made available every few years or on an as needed basis. As far as possible this would use a pre-designed framework in order to maintain consistency over time, and to facilitate international comparisons. It could also be a more in depth study of one particular aspect of revisions. A study of the impact of revisions to seasonal factors is already planned.

REVISIONS HISTORY OF THE QUARTERLY AUSTRALIAN NATIONAL ACCOUNTS

1. Introduction

The statistical measures presented below are consistent with those presented by the OECD and other countries, although there are many possible variations such as the time periods chosen for analysis, use of value data or percentage change data, and the extent and depth of analysis.

The two key revisions measures used are as follows:

- *Mean revision* – measures the extent to which, on average, initial estimates are either higher or lower than more 'mature' or the latest vintages. A mean revision different from zero indicates a tendency for initial estimates to either understate or overstate later estimates in the study period. Whether this represents a systematic bias in revisions is the subject of statistical significance testing. The significance test used in this study is the Heteroskedasticity Autocorrelation Consistent (HAC) t-statistic by Newey and West (1987).
- *Mean absolute revision* – measures the 'spread' of initial estimates around the corresponding revised estimates. Revisions are measured without regard to sign.

These measures are often supplemented by other measures such as revisions expressed as a percentage of average growth rates, median revisions, the standard deviation of revisions, counts of revisions of negative and positive sign, and counts of instances where the initial estimate and has a different sign (positive or negative growth) to later estimates.

The choice of whether to use the latest available estimate or a 'mature' estimate of a set interval as the reference point for calculating revisions is not clear cut. A set interval such as two or three years after the initial estimate has the advantage that it allows a consistent comparisons of revisions performance over time. It can be used to answer the question - are the national accounts becoming more or less reliable? Use of the latest available estimate allows revisions statistics to be calculated for a more recent time frame, but could present a misleading picture of the reliability of the series if revisions to observations that have not been through most of the processing cycle are included with those that have matured more fully. A further disadvantage with using latest available estimates is that the results are more subject to influence by occasional conceptual changes over time.

1. Introduction continued

The study presented here derives revisions as the difference between the initial estimate and the estimate three years later (Y3). By this time the estimates have been subject to two rounds of the supply-use balancing process which incorporates final data sources for most series. This time interval is also consistent with the revisions data presented by the OECD and some other statistics agencies. The revisions analysis is undertaken on quarter on previous quarter percentage change estimates.

Analysis has been conducted on seasonally adjusted, chain volume growth rates, except for income-based GDP and components which are only available in current price terms. These are the series most used by economic policy advisers and analysts. Revisions in such estimates can stem from revisions in a large number of original current price components of an aggregate as well as the price deflators and seasonal factors used to create the estimates. It is a major task to fully examine the reasons behind revisions and it has not been attempted here. Future research will attempt to throw further light on this.

Initial estimates included in the study are June quarter 1988 through to December quarter 2002. At the time the data were drawn for the study (early 2006), this was the latest quarter that had gone through the standard three years of revisions (Y3 is December quarter 2005). Where the 'latest' available vintage is used as the point of comparison with initial estimates it is also taken as the data available as at the December quarter 2005. Initial and revised estimates of GDP growth for more recent quarters (up to December quarter 2006) can be seen in the data triangle above, although they are not included in the results presented below.

Revisions statistics for three 5 yearly sub-periods are also shown:

Period 1 – March quarter 1988 to December quarter 1992
Period 2 – March quarter 1993 to December quarter 1997
Period 3 – March quarter 1998 to December quarter 2002.

No attempt has been made to assess what is a significant level of revision from an economic analyst's point of view. This will depend on the use to which the data are put. Users need to assess for themselves whether initial and later estimates are fit for purpose using the whole range of quality indicators and use the data accordingly. Nevertheless, ABS remains interested in quality improvement and is in regular contact with key users to explain the estimates and get feedback on any data quality concerns.

2. Results

SUMMARY

The main findings from an analysis of revisions to initial estimates of quarterly growth for the 59 quarters between March quarter 1988 and December quarter 2002 are as follows:

- Initial estimates of quarterly GDP growth were revised upwards on average by 0.1 percentage points which can be compared with its average growth rate of 0.81%. The expenditure, production and income variants also tended to be revised upwards, although the mean results for the series below that level were in both directions.

2. Results continued

SUMMARY *continued*

- When subjected to a probabilistic test of statistical significance, mean revisions to initial estimates of GDP, GDP(P) and private gross fixed capital formation were found to be biased downwards (initial estimates understate growth), but in each of these cases the earliest sub-period was the main contributor to the result. No other series in the study were found to be biased.
- The spread of initial estimates of quarterly GDP growth as measured by the average absolute revision was 0.37 percentage points, which can be compared with the mean absolute growth rate in GDP of 0.90%. Average absolute revisions to the expenditure, production and income variants were slightly higher and for some of the component series significantly higher, but this has to be seen in the context of the higher volatility of some of the components.
- Although average revisions to GDP are not insignificant compared to its growth rate, one-third of revisions were between plus and minus 0.0 and 0.2 percentage points and initial estimates successfully indicated that the economy was growing above or below the long term trend growth rate 75% of the time.
- Initial estimates performed satisfactorily in identifying the most significant peak and trough in the early 1990s.
- OECD research shows that the magnitude of revisions to Australia's GDP growth is in the middle for the 18 OECD countries included in their study.
- Some component series have been revised substantially. Components that should receive the highest priority for future work are private and public gross fixed capital formation, change in inventories and government final consumption expenditure. These series are prone to revision and are large expenditure-side contributors to growth in GDP.

These findings are consistent with ABS advice that, given the qualifications around the accuracy and reliability of the quarterly national accounts, trend estimates provide the best guide to the underlying movements.

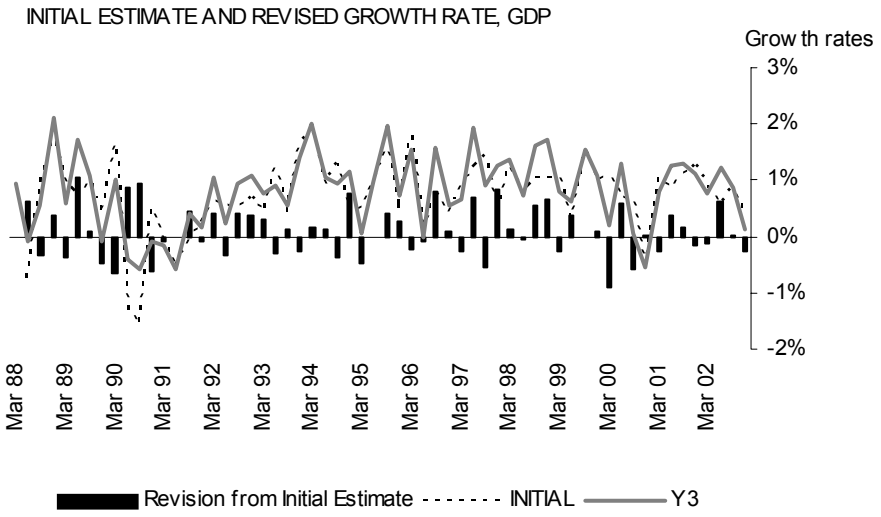
It should also be borne in mind that the ABS continues to make improvements to the data sources and methods used in the national accounts and therefore revisions results for past periods are not necessarily indicative of the characteristics of future revisions.

GROSS DOMESTIC PRODUCT (GDP)

The initial and revised quarterly growth rates for each quarter in the study period together with the magnitude of the revision (in percentage points) are shown in the following graph. The table below presents data for average revisions for the whole period and each of the three 5 yearly sub periods, together with other related data.

2. Results continued

GROSS DOMESTIC PRODUCT (GDP) *continued*



Initial growth rates have been revised in both directions, with an almost equal number of revisions in each direction. The mean value of revisions was 0.10 percentage points, compared with the average growth rate of 0.81 per cent. The median value of revisions was only slightly lower at 0.08 percentage points. The mean revision was tested for statistical significance using the standard t-statistic and the preferred Heteroskedasticity Autocorrelation Consistent (HAC) t-statistic. The HAC t-statistic (but not the standard t-statistic) indicated that initial estimates of GDP growth are biased downwards, although none of the sub-periods alone were biassed. Care has to be taken in the interpretation of these tests, and in particular they should not be taken as an indication of a bias in initial estimates of future quarters because the ABS is constantly improving the data sources and methods used to compile the national accounts. This caution is further strengthened by the mean revisions declining in each of the sub-periods in the table. Nevertheless, the tendency for initial estimates to understate growth shown in the table for a more recent period will be subject to further investigation.

GDP, Initial estimate versus estimate three years later

	FULL	PERIOD 1	PERIOD 2	PERIOD 3
	1988:2 to 2002:4	*1988:2 to 1992:4*	*1993:1 to 1997:4*	*1998:1 to 2002:4*
Number of observations	59	19	20	20
Mean growth rate	0.81	0.48	1.05	0.90
Mean absolute growth rate (%)	0.90	0.69	1.05	0.95
Mean revision (Y3-Initial) (% points)	0.10	0.14	0.10	0.05
Median revision (Y3-Initial) (% points)	0.08	0.08	0.11	0.02
Mean revision statistically significant?	Yes	No	No	No
Proportion of positive revisions (%)	56	53	60	55
Mean absolute revision (Y3-Initial)	0.37	0.45	0.35	0.31
Initial estimates with incorrect sign	3	3	—	—

— nil or rounded to zero (including null cells)

2. Results continued

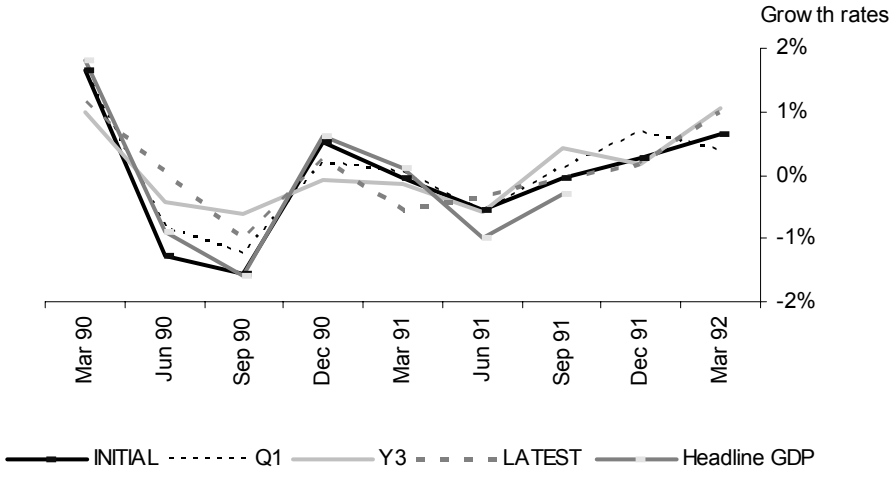
GROSS DOMESTIC PRODUCT (GDP) *continued*

The mean absolute revision to initial estimates was 0.37 percentage points compared with the mean absolute growth rate of 0.90 per cent. One-third of the revisions were no greater than 0.2 percentage points and just under three-quarters of revisions were no greater than 0.5 percentage points. The maximum revision to an initial estimate was 1.05 percentage points. When the sub-period data in the table is considered, the size of mean absolute revisions has declined.

The direction of growth of initial estimates was reversed 3 times out of the 59 quarters in the study period (December quarter 1989, December quarter 1990 and September quarter 1991). The fact that the sign reversals occurred around and during the 1990–91 recession period is consistent with the observation that economic measurement is typically more difficult at these times. Also, growth rates are also often close to zero, making a sign reversal more likely. Turning points and recession periods are of particular interest to economic analysts and policy advisors, and it is even more important that economic information is reliable at these times.

The graph below highlights various vintages of GDP data around the 1990–91 recession period. The initial estimates successfully identified the turning points but indicated a deeper decline in the early period and a stronger temporary recovery in the middle period of the recession than the revised estimates. It should be noted that the ABS changed its preferred headline measure of GDP during this period. Up until September quarter 1991 GDP(I) was the headline measure, although the preferred average measure (GDP(A)) was available with a lag from the June quarter 1990 and became the headline from the December quarter 1991 issue.

INITIAL ESTIMATE AND REVISED GROWTH RATES, 1990–92



Another way of looking at the potential significance of revisions is whether initial estimates successfully indicate whether the economy is growing above or below long term trend. Taking the long term trend growth rate as 0.8 percent, this was achieved 75% of the time.

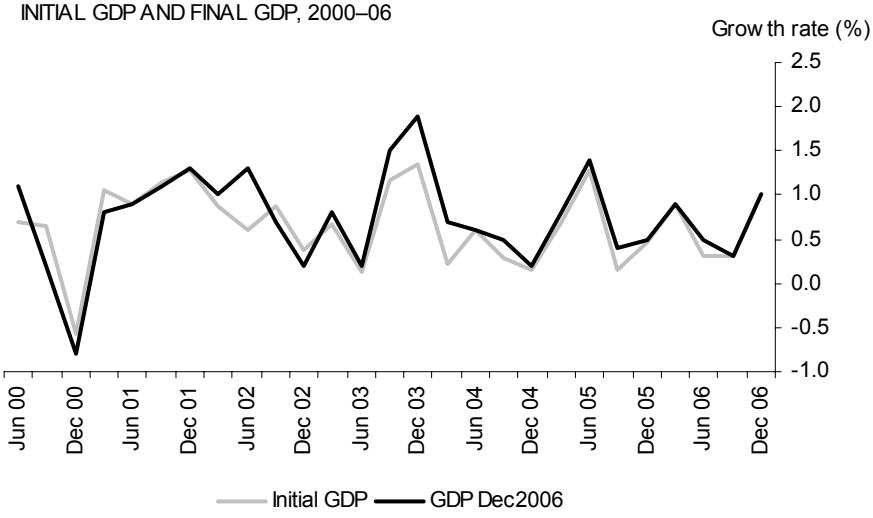
2. Results continued

GROSS DOMESTIC PRODUCT (GDP) *continued*

When forming a view about the economy, it could be expected that users of economic data will not only consider the estimates for any one quarter or any one economic data item in isolation. The ABS warns that, 'given the qualifications regarding the accuracy and reliability of the quarterly national accounts ... trend estimates provide the best guide to the underlying movements, and are more suitable than either the seasonally adjusted or original data for most business decisions and policy advice' (cat. no. 5206.0, Explanatory Notes). The revisions data described here also indicate that too much emphasis should not be put on initial estimates in isolation.

The data included in the analysis cuts-off in December quarter 2002 in order to present revisions data based on a consistent three years of revision throughout. The table below provides an update for the more recent period. It shows both the initial estimates of GDP growth and the estimates as published in the December 2006 issue of the quarterly national accounts. On the evidence so far, nearly all of the quarters since March quarter 2003 have been revised upwards. This observation has to be used with caution because the revisions cycle for much of the period is still incomplete. No revisions statistics are presented.

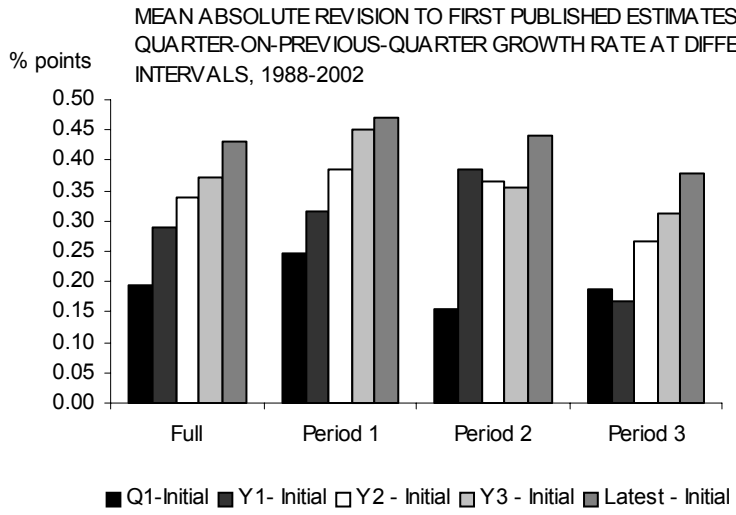
INITIAL GDP AND FINAL GDP, 2000–06



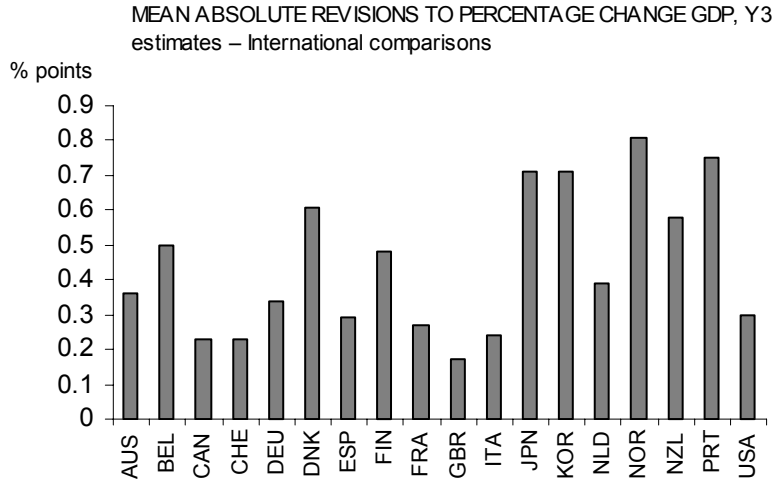
The graph below presents the mean absolute difference between first published estimates of GDP and later vintages of revised GDP. These later vintages are one quarter later, one, two and three years later, and the latest available (taken as December quarter 2005). It indicates the length of time taken for quarterly estimates of growth to 'settle down' after the initial estimate. For the full period and two of the three sub-periods in the study, around one-half of the revision occurred in the following issue of the publication. Also, while revisions still occur after the 'mature' Y3 vintage estimate, on average they are less than plus or minus 0.1 percentage point.

2. Results continued

GROSS DOMESTIC PRODUCT (GDP) *continued*



The following graph compares the Australian mean absolute revision to initial estimates of percentage change GDP with other countries included in an OECD study. The reference quarters are for 1995.1 to 2002.4. Compared with these other countries, Australia has experienced a moderate level of revision.



Source: OECD paper - Revisions in quarterly GDP of OECD countries: An update paper presented at the Working party of National Accounts, October 10-13 2006.

GDP is derived in Australia as the average of the conceptually equivalent expenditure (GDP(E)), production (GDP(P)) and income (GDP(I)) components. The chain volume measure of GDP(I) is the current price measure deflated by the GDP(E) implicit price deflator. The table below shows the summary revisions statistics for these three top level components alongside GDP itself. The mean revision statistics shows that the initial estimates of each of the three components also have a tendency to slightly understate growth, although none pass a statistical test of significance.

2. Results continued

GROSS DOMESTIC PRODUCT (GDP) *continued*

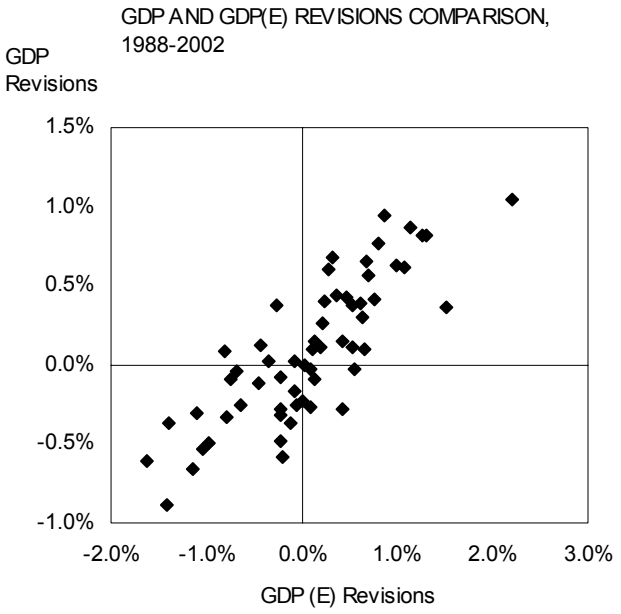
GDP AND ITS TOP LEVEL COMPONENTS, Initial estimate versus estimate three years later

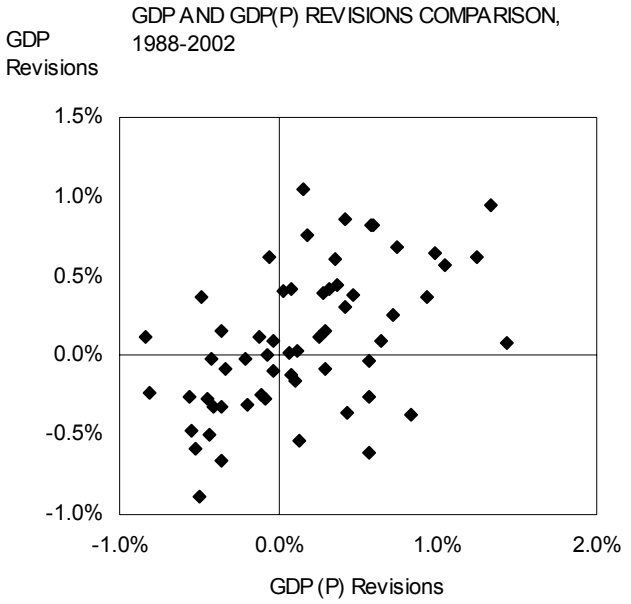
	MEAN REVISION (% POINTS)				MEAN ABSOLUTE REVISION (% POINTS)				
	Full	*Period 1*	*Period 2*	*Period 3*	*Full*	*Period 1*	*Period 2*	*Period 3*	*Number of Sign Changes*
GDP	0.10	0.14	0.10	0.05	0.37	0.45	0.35	0.31	3
GDP(E)	0.09	0.05	0.10	0.10	0.60	0.89	0.44	0.50	8
GDP(P)	0.16	0.26	0.13	0.10	0.44	0.55	0.40	0.37	6
GDP(I)	0.07	0.10	0.10	0.03	0.51	0.44	0.45	0.64	6

Ideally, revisions to GDP could be further decomposed to reveal the major contributors. This is a complex and detailed task because revisions to GDP are a consequence of revisions in the many expenditure, product and income component series and the source data from which they are derived together with their transformation from original current price estimates to chain volume and seasonally adjusted estimates. Also, revisions to components are in both directions and tend to be more or less offsetting when summed through to GDP. A detailed analysis has not been attempted in this study, although further work is planned for the future.

However, as a first step, the correlation between revisions in GDP and the top level components can be presented. The scatter plots below show that revisions to GDP(E) are more highly correlated to revisions in GDP than either GDP(P) or GDP(I). The correlation coefficients are 0.83, 0.51 and 0.60 respectively. The upper left and lower right quadrants show revisions that were in the opposite direction to revisions in GDP. Given the equal weighting of the three components in GDP this would be consistent with revisions in GDP(E) being larger or that revisions to GDP(P) and GDP(I) tend to go in opposite direction or a combination of both. Some further observations about the contribution of the expenditure components to revisions in GDP are made in the section on expenditure-based GDP below.

2. Results continued GROSS DOMESTIC PRODUCT (GDP) *continued*



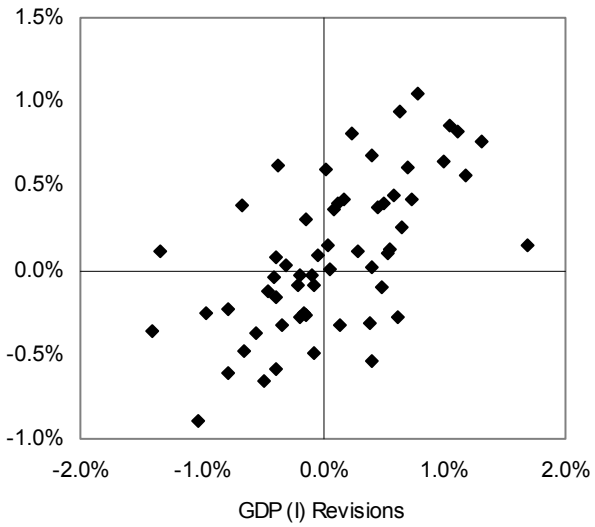


2. Results continued

GROSS DOMESTIC PRODUCT (GDP) *continued*

GDP Revisions

GDP AND GDP (I) REVISIONS COMPARISON, 1988-2002



EXPENDITURE-BASED GDP (GDP(E)) AND COMPONENTS

The revisions history of the expenditure-based components of GDP is shown in the tables and charts below.

EXPENDITURE-BASED GDP AND COMPONENTS, Initial estimate versus estimate three years later

	MEAN REVISION				MEAN ABSOLUTE REVISION					
	Full 59 obs	*Period 1 19 obs*	*Period 2 20 obs*	*Period 3 20 obs*	*Full 59 obs*	*Period 1 19 obs*	*Period 2 20 obs*	*Period 3 20 obs*	*Mean growth rate*	*Mean absolute growth rate*
	% points	% points	% points	% points	% points	% points	% points	% points	%	%
GDP(E)	**0.09**	**0.05**	**0.10**	**0.10**	**0.60**	**0.89**	**0.44**	**0.50**	**0.79**	**0.93**
Household final consumption expenditure	–0.01	0.04	0.04	–0.10	0.31	0.34	0.24	0.34	0.86	0.89
Government final consumption expenditure	–0.26	–0.69	–0.17	0.06	1.98	2.27	2.05	1.62	0.72	1.24
Private gross fixed capital formation	0.88	1.20	0.81	0.65	2.20	1.74	1.56	3.26	1.26	3.71
Public gross fixed capital formation	–0.22	–1.02	–0.81	1.12	7.38	6.29	4.95	10.85	1.66	10.42
Changes in inventories	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Exports of goods & services	0.04	—	–0.05	0.17	1.48	2.36	1.32	0.79	1.42	2.42
less Imports of goods & services	–0.21	–0.13	–0.35	–0.16	1.15	1.68	0.79	1.02	1.88	2.98

. . not applicable — nil or rounded to zero (including null cells)

The substantial variation in the magnitude of revisions between components has to be seen in the context of the volatility of each series. It could normally be expected that initial estimates of growth in a volatile series would be more subject to revision than a smoother series, and the table shows this to be the case. Users of the national accounts are likely to have a different level of tolerance to revisions depending on the series

2. Results continued

EXPENDITURE-BASED GDP (GDP(E)) AND COMPONENTS *continued*

volatility. All else being equal, a given percentage point revision in a volatile series will be of less concern than the same level of revision in a relatively smooth series.

The scatter plots above showed that revisions to GDP are more highly correlated to revisions in GDP(E) than either the product or income measures. Some indication of the relative contribution of expenditure side components to revisions in quarterly GDP can be provided by weighting the component revisions. The table provides two sets of weights. The first is the components average contribution to the level of GDP over the study period. Household final consumption expenditure obviously receives the highest weight, contributing on average 58.1% of GDP, and revisions to change in inventories receives the lowest, contributing on average only 0.3% of GDP. The second set of weights is the mean absolute contribution of the component to growth in GDP. Although private gross fixed capital formation contributes less than half that of household final consumption expenditure to the level of GDP, its mean contribution (without regard to sign) to growth in quarterly GDP is greater. Change in inventories contributes as much to growth as household final consumption expenditure, although its average contribution to the level of GDP was only 0.3%. This reflects the extreme quarter to quarter volatility of change in inventories. The expenditure side statistical discrepancy was also a significant contributor to growth.

EXPENDITURE COMPONENTS, Weighted revisions

	Mean Absolute Revision	*Mean Contribution to GDP*	*Weighted mean absolute revision to GDP*	*Mean absolute contribution to growth in GDP*	*Weighted mean absolute revision to growth in GDP*
	% points	%	% points	% points	% points
Household final consumption expenditure	0.31	58.20	0.18	0.52	0.17
Government final consumption expenditure	1.98	18.80	0.37	0.24	0.38
Private gross fixed capital formation	2.20	17.60	0.52	0.66	0.39
Public gross fixed capital formation	7.38	3.90	0.29	0.31	0.22
Changes in inventories	. .	0.30	. .	0.52	. .
Exports of goods & services	1.48	16.30	0.24	0.40	0.24
less Imports of goods & services	1.15	–15.10	0.17	0.40	0.15
Statistical discrepancy (E)	. .	–0.10	. .	0.42	. .
GDP	0.37	100.00	0.37	0.90	. .

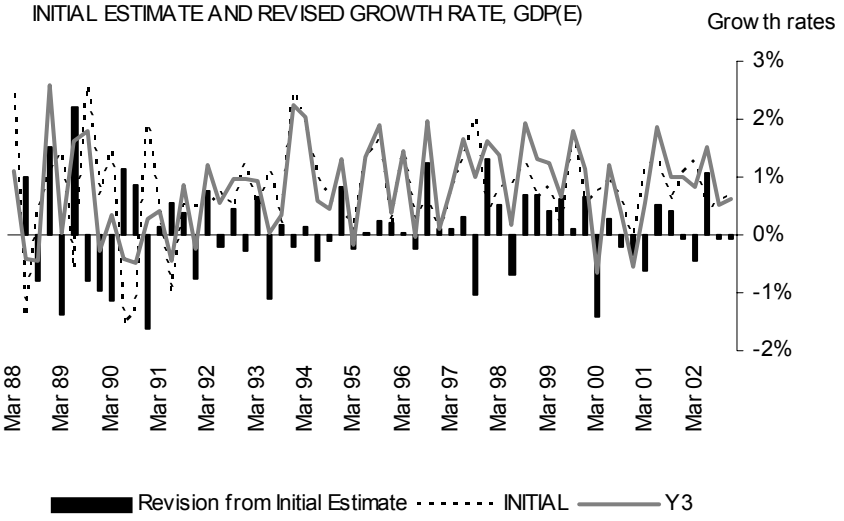
. . not applicable

Whichever set of weights are applied to the revisions for each component, the weighted results indicate that public and private gross fixed capital formation and government final consumption expenditure are key drivers of revisions in GDP from the expenditure side, although the revisions in components, including the statistical discrepancy, will be largely offsetting. Change in inventories, is the equal second largest contributor to growth in GDP on the expenditure side. Although it is not possible to calculate a weighted mean revision figure in percentage points for comparison in the table, data provided later in this section shows it is heavily revised and should be grouped with private and public gross fixed capital formation as deserving of priority attention in future revisions analysis work.

2. Results continued

GDP(E)

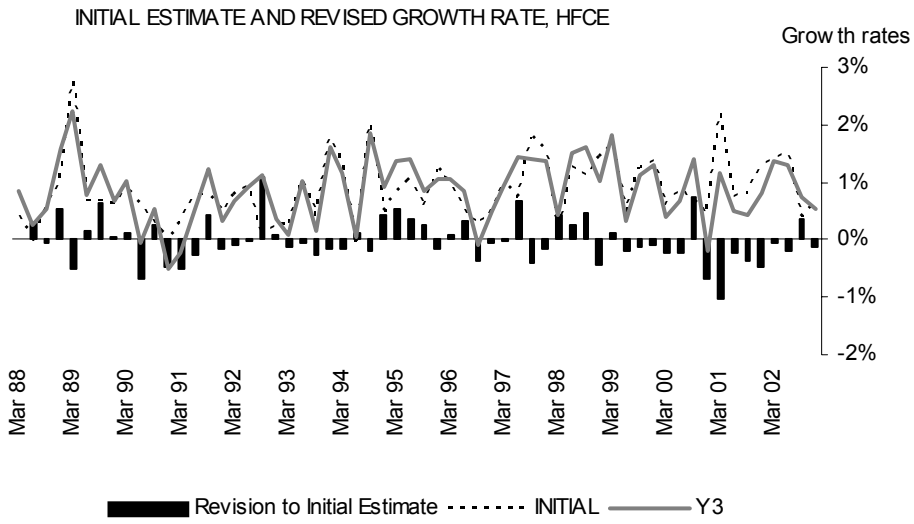
The mean revision to GDP(E) was 0.09 percentage points, with the proportion of positive revisions being 59%. The mean absolute revision was 0.60 percentage points, with a maximum revision of 2.2 percentage points. The first sub-period was particularly subject to revisions. There were 8 cases (14%) where initial estimates of GDP(E) gave an erroneous indication of the direction of growth.



Household final consumption expenditure (HFCE)

HFCE accounted for 58.1% of GDP(E) in December quarter 2005 and was the least revised component of GDP(E). The mean revision was –0.01 percentage points, while 41% of revisions were positive. The mean absolute revision was relatively low at 0.31 percentage points, although individual revisions have been as high as 1.1 percentage points. In 10% of instances the sign of the initial growth rates changed.

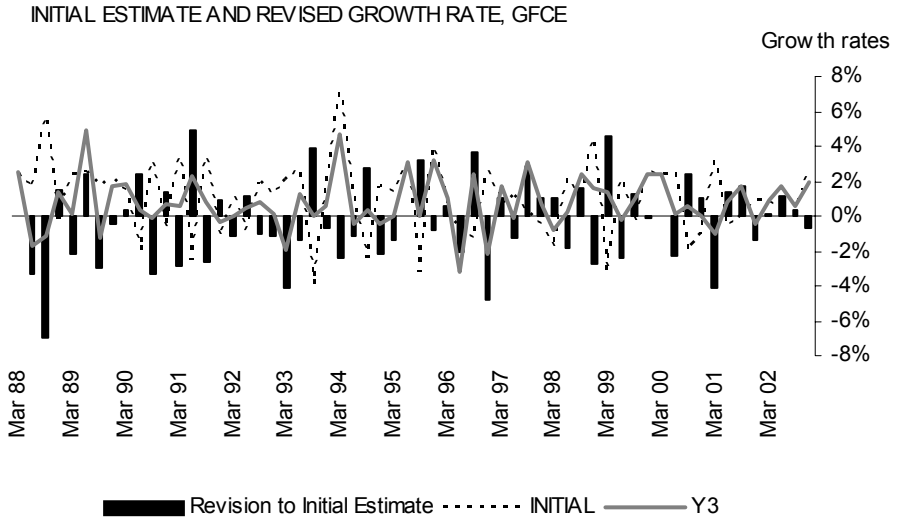
The relatively low level of revision to HFCE reflects in part the weight given to the monthly Retail Business Survey in the national accounts estimation process. It is regarded as the mostly accurate source of information for the goods component of HFCE and the estimates of that part of GDP will tend to remain unrevised in the supply and use balancing process. The services component of HFCE is more likely to be subject to revision as later sources become available.



2. Results *continued*

Government final consumption expenditure (GFCE)

GFCE accounted for 18.7% of GDP (E) in December quarter 2005. The mean revision was –0.26 percentage points, with the proportion of positive revisions being 50%. The mean absolute revision was 1.98 percentage points, with the largest revision being 6.95 percentage points. In 47% of cases, the initial estimates gave an erroneous indication of the direction of growth. It would appear reasonable to conclude that initial estimates of GFCE have been a relatively poor indicator of later estimates. A high degree of revision is persistent over most of the time period, although there was an improvement in the last few quarters of the study.



Private gross fixed capital formation (Private GFCF)

Private GFCF accounted for 17.6% of GDP(E) in December quarter 2005. The mean revision was 0.88 percentage points, with the proportion of positive revisions being 64%. The HAC t-statistic indicated that initial estimates of growth for this series are biased. Much of this is contributed by the earlier sub-period in the study (mean revisions in percentage points were 1.20, 0.81 and 0.65 respectively in each of the sub-periods). The mean absolute revision was 2.2 percentage points, with the highest revision being 13.62 percentage points. This particularly large revision occurred in the December quarter

2. Results *continued*

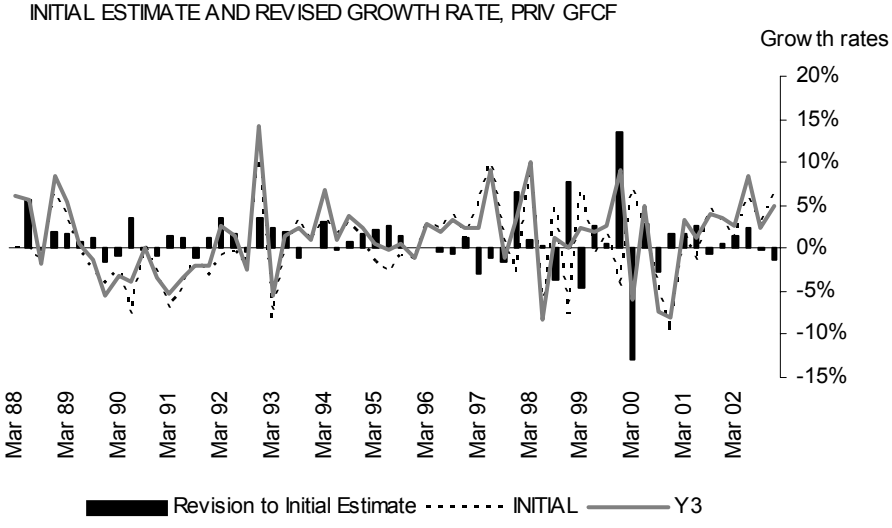
Private gross fixed capital formation (Private GFCF) continued

1999 and was followed by a similar sized revision in the opposite direction to the following quarter (March quarter 2000). This revision to adjacent quarters resulted from a reassignment of a major second-hand asset purchase from the public sector. The same correction, in the opposite direction, is reflected in public GFCF revisions data (sales of assets are treated as negative GFCF). As such, the revision to the timing of the asset sale did not impact on total GFCF or GDP(E) and if desired, could be removed as outliers in the calculation of revisions statistics for this series. The relatively high level of the mean absolute revision statistic has to be seen in the context of the relatively high volatility of the private GFCF series. For much of the time, the initial and Y3 estimates track reasonably well, although in the late 1990s there was some significant divergence.

Significant revisions were made to private GFCF data prior to June quarter 1998 as a result of changes to the assets boundary with the implementation of SNA93. The scope of assets was widened to include computer software, mineral exploration and entertainment and artistic originals and the changes were backcast to the full length of the series. This will have had some impact on the revisions statistics prior to that date, but the use of the Y3 estimate as the point of reference for revisions will have mitigated the effect on the results.

In 23% of cases, the initial estimates gave an erroneous indications of the direction of growth. In a number of cases, these resulted from relatively minor revisions to a volatile series.

INITIAL ESTIMATE AND REVISED GROWTH RATE, PRIV GFCF



2. Results *continued*

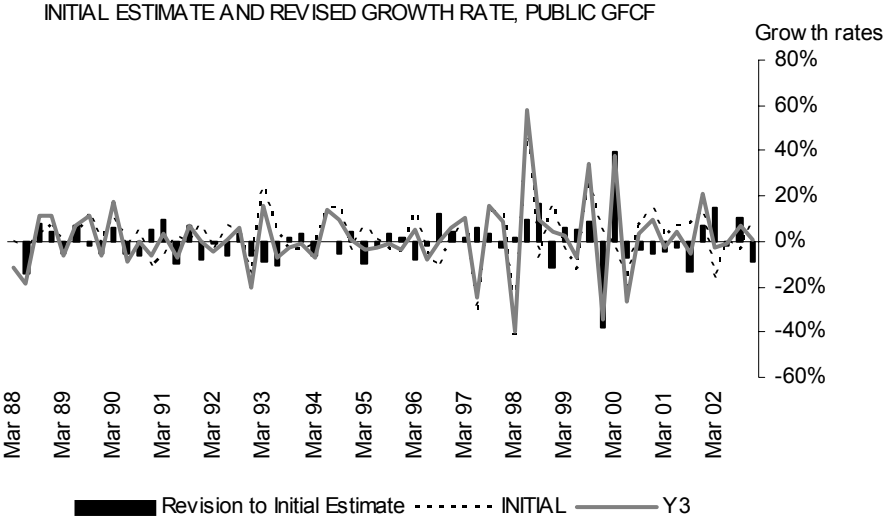
Public gross fixed capital formation (Public GFCF)

Public GFCF accounted for 3.9% of GDP(E) in December quarter 2005. The mean revision was –0.22 percentage points, with the proportion of positive revisions being 50%. The mean absolute revision was 7.38 percentage points, with the highest revision being 39.46 percentage points. The nature of this large revision is described above for private GFCF – the same correction, in the opposite direction, is reflected in private GFCF revisions data. If desired, they could be removed as outliers in the calculation of revisions statistics for this series. The series was also affected by the conceptual changes introduced with SNA93 as described above for private GFCF. A more important SNA93 change for the public sector was the capitalisation of certain defence expenditures. As for private GFCF, the impact of these revisions would only be partly evident in the revisions data shown here because of the use of the Y3 estimate as the reference point for calculating revisions.

In 30% of cases, the initial estimates gave an erroneous indication of the direction of growth.

Public GFCF is a particularly volatile series, and as for private GFCF, revision statistics should be assessed in that context. Nevertheless, it appears that initial estimates for this series have been a relatively poor indicator of growth.

INITIAL ESTIMATE AND REVISED GROWTH RATE, PUBLIC GFCF



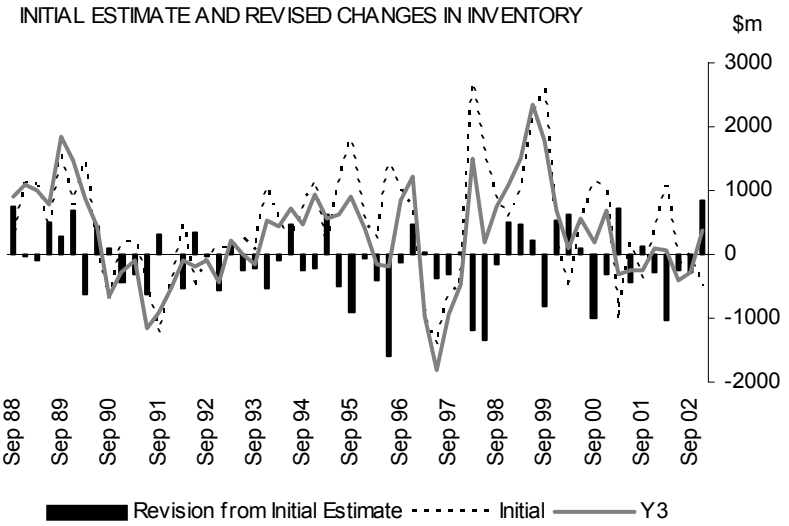
Change in Inventories

Change in inventories accounted for 0.3% of GDP(E) in December quarter 2005. Although it makes only a small contribution to the level of GDP(E) (typically around zero to plus and minus 1.0%) it can have a significant contribution to growth because of its extreme volatility (it can be positive or negative). On average over the study period, change in inventories contributed plus or minus 0.52 percentage points to growth in GDP(E). There were a number of quarters in which it contributed more than plus or minus 1.0 percentage point to GDP(E) growth.

As sensible percentage change data cannot be calculated for change in inventories, the graph below shows the magnitude of revisions in current dollar values. Despite the difficulties in interpreting current price data over time, there is no indication of a strong tendency for initial estimates to be either under or overstated, although the number of

2. Results continued *Change in Inventories continued*

quarters that were revised upwards was slightly higher (59%). However, the series is subject to substantial revision, and in 25% of instances the initial estimates had their direction of change reversed.

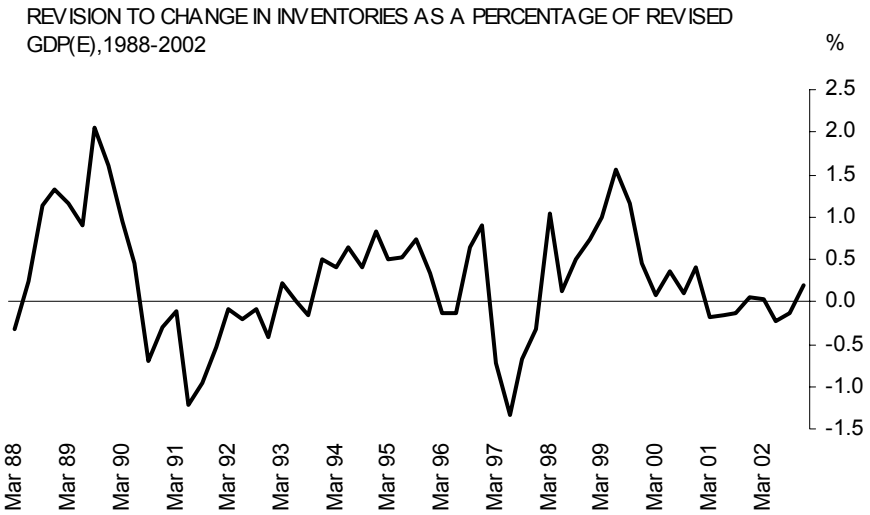


The following graph records revisions to change in inventories as a per cent of GDP(E). It shows what the impact of the revision to change in inventories would be on growth in GDP(E) if all else remained equal (in reality there will also be a combination of reinforcing and offsetting revisions from other components of GDP(E)). Revisions to change in inventories were on average 0.56% of GDP(E), although in individual quarters it has been much higher, indicating that they are a major factor in revisions to GDP(E).

Change in inventories is a difficult series to estimate because it is the difference between estimates of opening and closing inventory stock levels. Small revisions to data for stock levels can have significant impacts on the difference, and an even bigger impact on the second difference which feeds through to growth in GDP(E). There is a further difficulty arising from the seasonal adjustment of crops – forward estimates have to be prepared of the value of the harvest in the current year, and depending on actual weather conditions and prices there may be significant revisions to the earlier estimates when the crops come in. The difference between the forecast and the actual crop will be reflected in the revisions data for seasonally adjusted change in inventories.

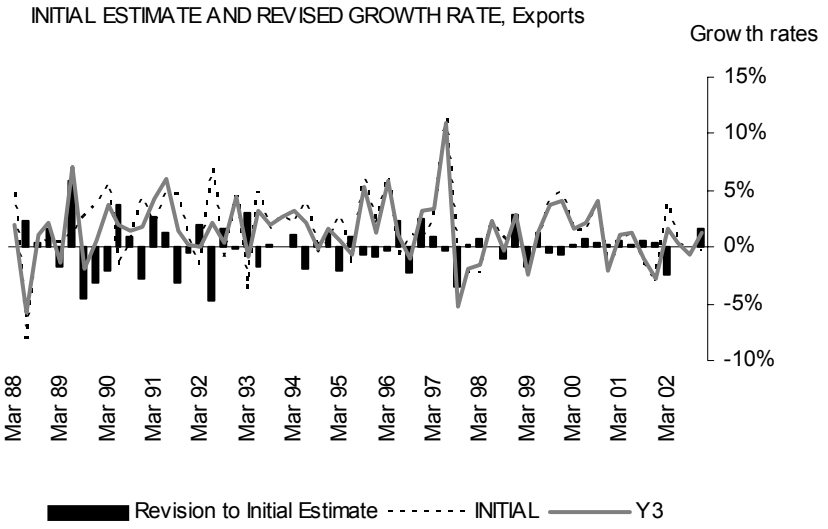
2. Results *continued*

Change in Inventories continued



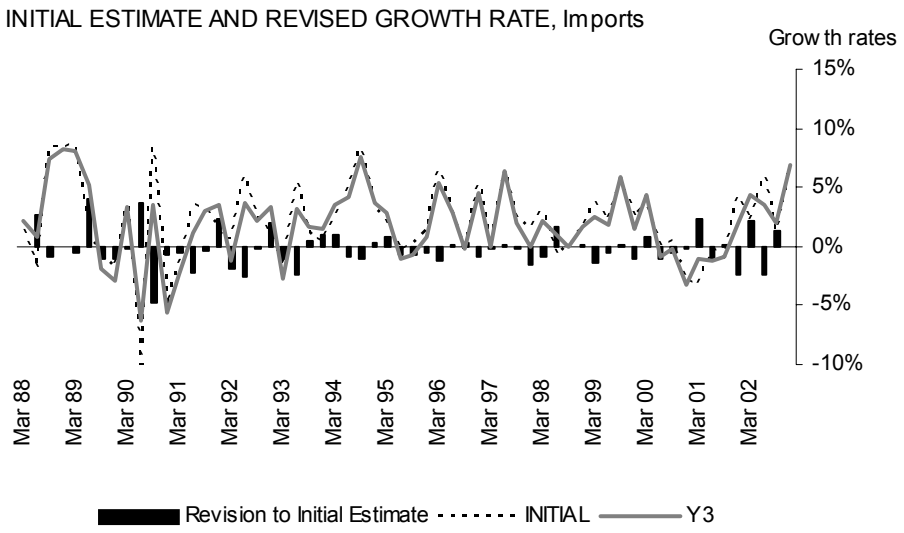
Exports of goods and services

Exports of goods and services accounted for 16.3% of GDP(E) in December quarter 2005. The mean revisions was 0.04 percentage points, with 50% of initial estimates being revised upwards. The mean absolute revision was 1.48 percentage points, but has decreased over each of the sub-periods in the study. 14% of initial estimates of movement had their sign reversed. Initial estimates for a large part of the services component is modelled and replaced by actual data mainly in the following quarter.



Imports of goods and services

Imports accounted for –15.1% of GDP(E) in December quarter 2005. The mean revision to imports was –0.21 percentage points, with the proportion of positive revisions at 42%. A downwards revision to imports is a positive revision to GDP. The mean absolute revision was 1.15 percentage points and 8% of initial estimates of movement had their sign reversed. Initial estimates for a large part of the services component is modelled and replaced by actual data mainly in the following quarter.

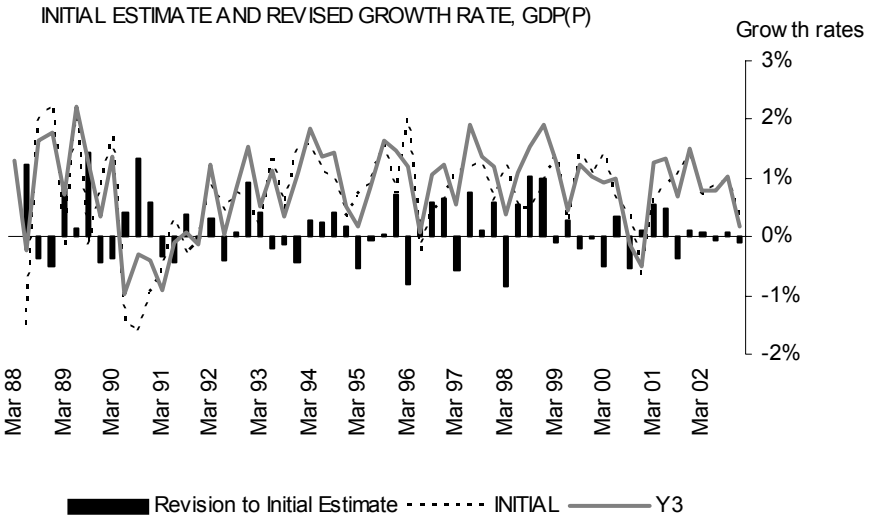


2. Results continued

PRODUCTION-BASED GDP (GDP(P))

The mean revisions to initial estimates of GDP(P) was 0.16 percentage points and 59% of quarters the revision was in a positive direction. The HAC t-statistic indicates that initial estimates of growth in GDP(P) are biased downwards with the earliest sub-period contributing substantially to this result. Mean revision for each of the three sub-periods were 0.26, 0.13 and 0.10 percentage points respectively. The mean absolute revision was 0.44 percentage points. There were 6 cases (10% of occasions) where the sign of initial estimates of growth were reversed.

No revisions data are presented for in the industry components of GDP(P). Industry data are yet to be included on the real-time data base of national accounts data.



INCOME-BASED GDP (GDP(I))

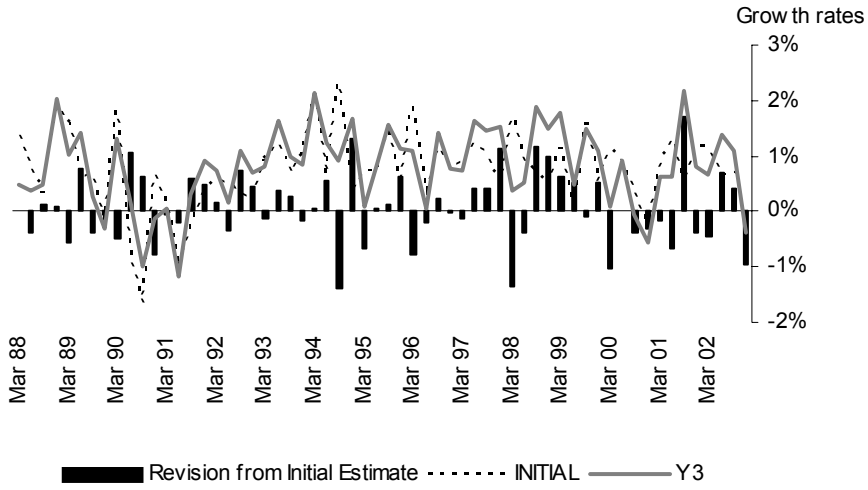
Chain volume estimate of GDP(I) are derived in the Australian national accounts by dividing the current price estimates of GDP(I) by the GDP(E) price deflator so that the income measure can be input into the derivation of quarterly GDP. Chain volume estimates of the individual income components are not calculated.

2. Results continued

INCOME-BASED GDP (GDP(I)) *continued*

The mean revisions to initial estimates of GDP(I) chain volume measure was 0.07 percentage points and on 53% of quarters the revision was in a positive direction indicating a slight tendency for estimates to be revised upwards over the study period. The mean absolute revision was 0.51 percentage points. There were 6 cases (8%) where the sign of the initial growth rate was reversed.

INITIAL ESTIMATE AND REVISED GROWTH RATE, GDP(I)



3. Current price, seasonally adjusted series

INCOME-BASED GDP (GDP(I)) AND COMPONENTS

Because the individual income components of GDP are not derived in chain volume terms, the revisions data are presented in current price, seasonally adjusted terms.

GDP(I) AND COMPONENTS, Initial estimate versus estimate three years later—Current prices

	MEAN REVISION PERIOD				MEAN ABSOLUTE REVISION PERIOD				CONTRIBUTION TO GDP(I)(a)	MEAN GROWTH RATE	MEAN ABSOLUTE GROWTH RATE
	Full	*1*	*2*	*3*	*Full*	*1*	*2*	*3*	*Full*	*Full*	*Full*
	% pts	% pts	% pts	% pts	% pts	% pts	% pts	% pts	%	%	%
GDP(I)	**0.06**	**0.21**	**–0.04**	**0.01**	**0.52**	**0.47**	**0.55**	**0.54**	**100.00**	**1.48**	**1.56**
Compensation of employees	0.12	0.34	0.07	–0.04	0.60	0.57	0.64	0.59	47.60	1.51	1.60
Gross mixed income(b)	. .	. .	. .	0.68	. .	. .	. .	2.11	8.20	1.87	2.78
Gross operating surplus(b)	. .	. .	. .	0.04	. .	. .	. .	1.52	32.80	1.50	1.94
Gross operating surplus - Private non-financial corporations	–0.22	–0.49	–0.20	—	2.47	2.37	2.32	2.70	18.00	1.78	3.08
Taxes less subsidies on production and imports	0.04	0.60	–0.18	–0.27	2.28	1.33	2.59	2.86	11.00	1.59	2.37

. . not applicable
— nil or rounded to zero (including null cells)

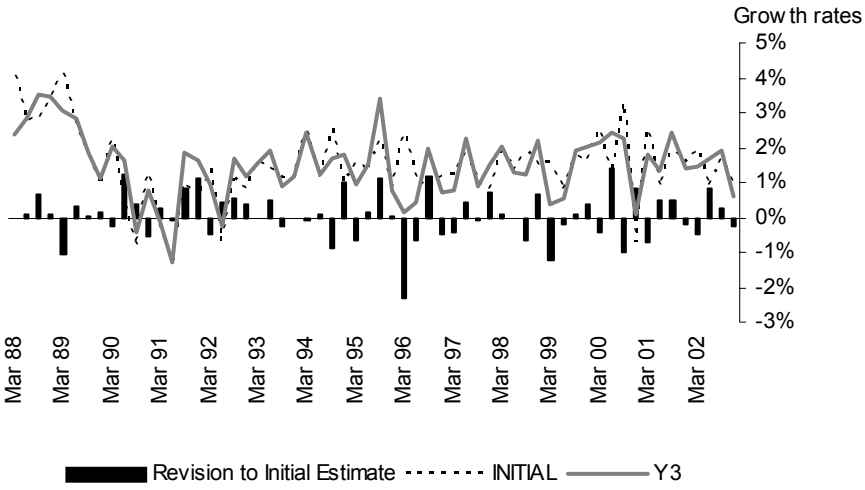
(a) As at December 2005.
(b) Revisions statistics based on 18 observations (1998:3 to 2002:4).

3. Current price, seasonally adjusted series continued

GDP(I)

The mean revision to initial estimates of GDP(I) was 0.06 percentage points, and the proportion of individual quarters which were revised upwards was 64%. Mean absolute revision was 0.52 percentage points. Only on one occasion was the direction of growth revised.

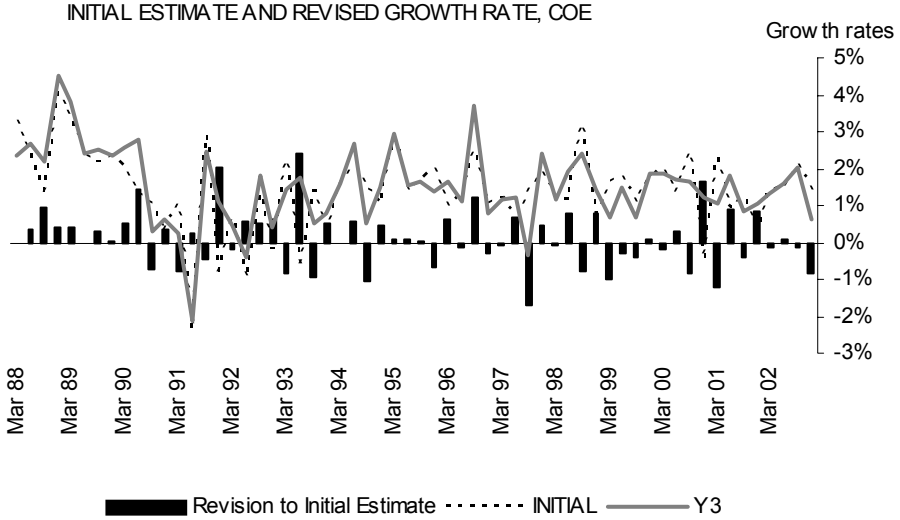
INITIAL ESTIMATE AND REVISED GROWTH RATE, GDP(I)



COMPENSATION OF EMPLOYEES (COE)

COE contributed 47.6% of GDP(I) in December quarter 2005. The mean revision to initial estimates of COE was 0.12 percentage points, with 61% of revisions being in a positive direction, showing a moderate tendency to revise upwards over the study period. The mean absolute revision was 0.60 percentage points, with very little variation over the three sub-periods. The direction of growth was revised on 8% of occasions.

INITIAL ESTIMATE AND REVISED GROWTH RATE, COE

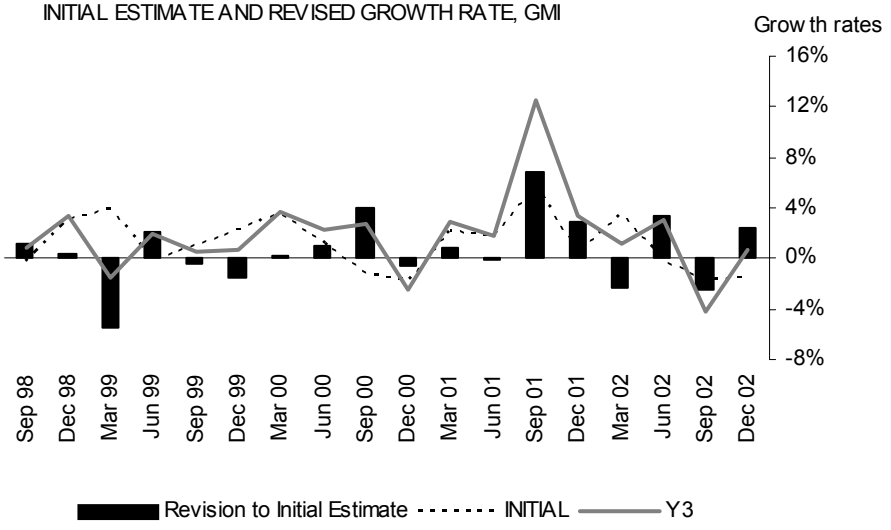


3. Current price, seasonally adjusted series continued

GROSS MIXED INCOME (GMI)

GMI contributed 8.2% of GDP(I) in December quarter 2005. GMI as a data item was included for the first time in September quarter 1998 as part of SNA93 implementation in the Australian national accounts. Prior to that point, GMI was included in 'gross operating surplus – other'. Revisions data shown below are for the period September quarter 1998 to December quarter 2002.

The mean revision to initial estimates of GMI was 0.68 percentage points, with 61% of revisions being in a positive direction. The mean revision result was affected by the particularly large upward revision in September quarter 2001, which if removed reduces the mean revision to 0.35 percentage points. The mean absolute revision was 2.11 percentage points. The direction of initial growth was reversed on 33% of occasions. These results are drawn from 18 observations.



GROSS OPERATING SURPLUS (GOS)

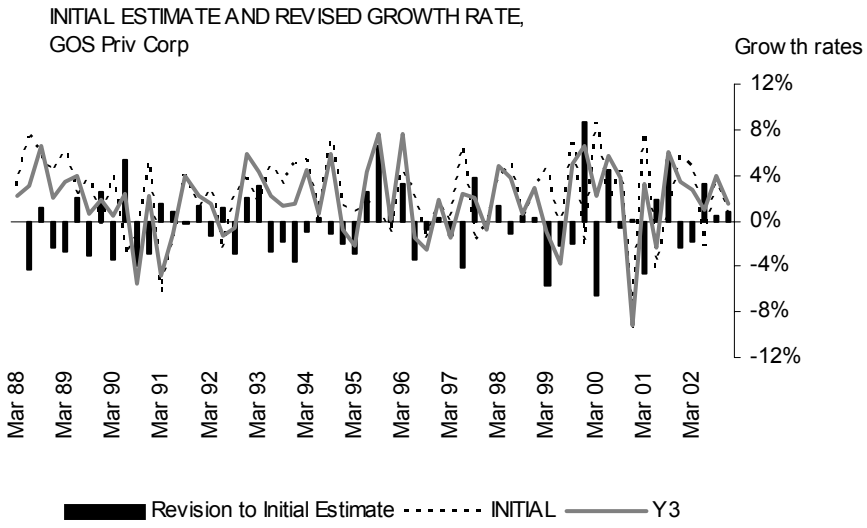
GOS contributed 32.8% of GDP(I) in the December quarter 2005. Because of changes to the content of GOS with the implementation of SNA93 in September quarter 1998, revisions statistics cannot be compiled on a comparable basis for the whole period of the study. Considering the period from September quarter 1998 to December quarter 2002, the mean revision to initial estimates of GOS was 0.04 percentage points and the mean absolute revision was 1.52 percentage points.

GOS – PRIVATE NON-FINANCIAL ENTERPRISES

GOS – private non-financial corporations contributed 18.0% of GDP(I) in the December quarter 2005. In order to provide a longer time period of data, revisions to initial estimates of private non-financial corporations GOS is shown in the graph below. That component was not affected by the SNA93 changes and is available for the full length of the study period. The mean revision to initial estimates was –0.22 percentage points with the proportion of positive revisions being 47%. The mean absolute revision was 2.47 percentage points. The direction of initial growth was reversed on 19% of occasions.

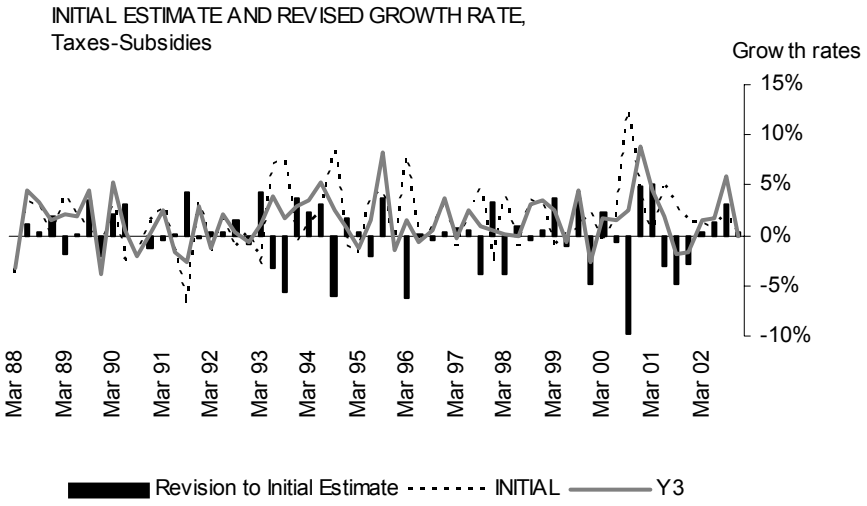
3. Current price, seasonally adjusted series continued

GOS – PRIVATE NON-FINANCIAL ENTERPRISES *continued*



TAXES LESS SUBSIDIES ON PRODUCTION AND IMPORTS

Taxes less subsidies on production and imports contributed 11.0% of GDP(I) in the December quarter 2005. The mean revision to initial estimates was 0.04 percentage points, with 59% of revisions being in a positive direction. The mean absolute revision was 2.28 percentage points and the direction of initial estimates of growth was reversed on 25% of occasions.



SECTION 11 CONCLUSIONS AND FUTURE WORK

CONCLUSIONS AND FUTURE WORK

The nature of the national accounts compilation process is that source data become available with a lag. There is generally a succession of source data beginning with incomplete preliminary monthly or quarterly indicator data. These data are eventually made consistent with preliminary annual data sources and eventually by final annual data that has been balanced within a supply and use system. This may be a number of years after the reference quarter. Even then there will be ongoing changes from improvements to methods and occasional changes to national accounting standards that are backcast to earlier periods, although it can be expected that estimates will 'settle down' within a reasonable period of time. The national accounts data are also subject to transformations to produce chain volume and seasonally adjusted and trend estimates to make them more useful for economic analysis.

Revisions are a natural consequence of this process. It is efficient if successive revisions keep moving the initial estimate towards a more accurate estimate. There is clearly a trade-off between timeliness and accuracy/reliability in that case. The processes to create chain volume and seasonally adjusted estimates also make their own contribution to revisions. Although users of the national accounts estimates should be aware of the trade-offs, they also need to be informed about the reliability of initial estimates to assist them to make their own judgements about how much weight to give to early estimates. Statistical agencies are also interested in this information as a guide to where they should put scarce resources into making quality improvements.

The study presented here is aimed at both informing users of the national accounts and the national accounts compilers themselves. It has provided intelligence that can be used to input into the setting of priorities for quality improvement. Some work is already planned to examine in more detail certain aspects of revisions. In particular, the impact of the seasonal adjustment process on revisions to seasonally adjusted and trend series will be examined. The series identified in this paper as likely key drivers to revisions in GDP will also be examined in more detail to see what lessons can be learned to improve processes in the future. The results of this and other work will be made available from time to time.

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