



Research Paper

Quality Measures for Systems of Economic Accounts

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John Zarb

Analytical Services Branch

Methodology Advisory Committee

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INQUIRIES

The ABS welcomes comments on the research presented in this paper.

For further information, please contact Dr Shiji Zhao, Analytical Services Branch on Canberra (02) 6252 6053 or email <shiji.zhao@abs.gov.au>.

QUALITY MEASURES FOR SYSTEMS OF ECONOMIC ACCOUNTS

John Zarb
Analytical Services

EXECUTIVE SUMMARY

This paper reports work in progress on a project called **Quality Measures for Systems of Economic Accounts (QMSEA)**.

The distinctive features of QMSEA are that it –

1. Is designed to review whether present and future systems of economic accounts (SEAs) are likely to be “fit for purpose”.
2. Looks beyond sample survey data to the full range of input data used to compile SEAs.
3. Will concord with the IMF Data Quality Assessment Framework (DQAF), an international standard being developed, but aims to be more comprehensive than DQAF – in both the breadth and depth of auditing quality aspects.
4. Will build upon the existing stock of information concerning quality aspects of SEAs.
5. Is designed primarily for a relatively small, sophisticated group of users (both outside and inside the ABS).
6. Might in the long run use a combination of ABS self-assessment and external assessment (by, say, a consortium of user agencies such as the Treasury, Reserve Bank of Australia and Prime Minister and Cabinet).
7. May be made available in electronic form so that it can be readily maintained and interrogated.

I think that something like QMSEA is needed because existing quality measurement procedures are only partial and give less than comprehensive information for assessment of whether SEAs and their statistics are fit for use.

The QMSEA development strategy involves the following steps –

- Initially defining an ideal set of quality indicators and refining them in co-operation with key stakeholders (producers and high-end users of SEAs).
- Conducting a pilot test on a couple of subsystems of economic accounts. Existing quality indicators will be assembled, even if imperfect, so that the quality

indicator matrix can be populated as much as possible, and a program planned for generating the remaining quality indicators to populate the matrix.

- After sufficient testing and bedding down on subsystems, QMSEA will be promulgated to full systems of economic accounts.

QUESTIONS FOR MAC

We would welcome MAC members' comments on any aspect of the QMSEA project, but in particular on the following questions –

- Is the QMSEA project worthwhile, in the light of the audience likely to comprehend its outputs?
- Are there aspects of quality for systems of economic accounts not adequately addressed in the QMSEA-type approach? What areas may need strengthening?
- Are there any suggestions as to how QMSEA should be developed and pilot tested?
- Are there any models for ways of presenting, disseminating and browsing the suite of quality measures?
- Should QMSEA-type quality audits remain purely ABS self assessments? How might the ABS work with external “auditors”?

This paper represents work in progress and does not necessarily reflect the final approach which the ABS will adopt.

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The role of the Methodology Advisory Committee (MAC) is to review and direct research into the collection, estimation, dissemination and analytical methodologies associated with ABS statistics. Papers presented to the MAC are often in the early stages of development, and therefore do not represent the considered views of the Australian Bureau of Statistics or the members of the Committee. Readers interested in the subsequent development of a research topic are encouraged to contact either the author or the Australian Bureau of Statistics.

QUALITY MEASURES FOR SYSTEMS OF ECONOMIC ACCOUNTS

John Zarb
Analytical Services

1. OVERVIEW OF QMSEA

1.1 Purpose of the project

This project considers the issues that arise when developing a comprehensive suite of **quality measures for systems of economic accounts (QMSEA)**.

The purposes of QMSEA are to help:

- key users when making informed decisions about the utility of the statistics and when assessing the “intelligence” provided by SEAs;
- producers of SEAs to determine, attain and maintain quality standards.

1.2 What are “systems of economic accounts”?

Economic accounts provide a systematic overview of the performance of large parts of the economy. They are essentially a set of concepts, classifications and accounting rules embedded within a comprehensive and articulated accounting framework. They are systems of accounts in the following senses –

- They are composed of a set of data, usually time series data, that are linked not only in an arithmetic compiling sense but also in a socioeconomic accounting sense.
- They are distinguished from merely a framework of ‘disciplined’ information because they employ procedures that transform directly observable items in clerical accounts into measures of the economic concepts needed for macroeconomic analysis. For instance, in the system of national economic accounts, the real world current dollar value of the turnover of goods and services is transformed in several complex steps into the key but intangible indicator ‘seasonally adjusted chain volume measure of the production of goods and services’.

That is, the system of economic accounts involves a rational accounting framework of linked data that are transformed by procedures that involve our best assumptions and understandings to produce ‘value added’ measures of concepts for analysis.

Many of the most important economic indicators are derived from SEAs. These indicators play a pivotal role in setting major socioeconomic policies. For example:

- changes in Gross Domestic Product (GDP) come from the Australian System of National Accounts;
- Government Financial Net Worth comes from the system of Government Finance Statistics;
- changes in the nation's Balance of Trade with the rest of the world, comes from the system of External Accounts; and
- changes in various 'inflation' indicators (consumer, producer, labour cost and international price indexes, as well as price measures derived from the national accounts) come from the family or system of price indexes.

All are considered to be important indicators of economic health. They are keenly examined by the key decision makers in both the public and private sectors.

BOX 1 – CORE ACCOUNTS MAKING UP THE AUSTRALIAN SYSTEM OF NATIONAL ACCOUNTS

The types of accounts in the Australian System of National Accounts (ASNA) reflect major economic processes occurring simultaneously in the economy – namely production, the distribution of income, consumption, saving and investment, financial flows and asset accumulation. The ASNA is composed of the following types of accounts: production accounts; income accounts; capital accounts; financial accounts; and balance sheets.

Each of these accounts is produced for the economy as a whole. In addition the income accounts, capital accounts, financial accounts and balance sheets are constructed for each of the four domestic institutional sectors. These four sectors are the non-financial corporations, financial corporations, households (including non-profit institutions serving households), and general government.

Another group of accounts that is an integral part of the ASNA is the external accounts. These accounts record the transactions and financial positions of Australia with the rest of the world. In the ASNA, the external accounts cover external income, capital, financial and balance sheet accounts. The external income account is analogous to the balance of payments current account. Its balance – balance on external current account – is the same as, but of opposite sign to, the balance on current account recorded in the balance of payments.

This is an example of one nexus that exists between a number of systems of economic accounts considered in this paper. Another example is the state accounts, that is, the national accounts dissected into regions: Victoria, New South Wales, etcetera.

Systems of economic accounts can be very complex and comprehensive. For example, consider the national accounts (Box 1).

The particular accounts discussed in Box 1 – the production, income accounts, etcetera – are referred to as the core accounts of the system of national accounts. There are, in addition to the core accounts, supplementary accounts referred to as ‘satellite accounts’ and ‘social accounting matrices’. See Box 2.

BOX 2 – SUPPLEMENTARY ACCOUNTS

Recently the core accounts of the systems of national accounts have been extended to address the analytical demands made upon them. Various socioeconomic and environmental issues are being confronted through supplementary or complementary satellite accounts or social accounting matrices.

For example, consider the release of the Tourism Satellite Account, 1997–98 in response to the House of Representatives Committee Report, *Taxing Relaxing*. Three further ABS satellite accounts are foreshadowed for development in response to user interest, namely the Household Production, Health, and Information Technology and Telecommunications satellite accounts.

Also, the ABS’s contribution to the development of the System of Economic and Environmental Accounts manual, particularly in the field of valuing environmental assets within the scope of the System of National Accounts is an example of world leading development in this area. The ABS has developed chain volume estimates of the economic capital stock of non-produced assets, such as land and subsoil assets – items that have probably not been published by any national statistical agency before.

The regular compilation of such comprehensive systems of integrated economic accounts, with their various detailed balance sheets, accumulation and flow accounts, attempts to aid understanding and analysis of various aspects of an economy’s performance. The accounts may also be an aid in assessing the efficacy of economic management and of policy intervention. However, besides essentially economic considerations, there are important sociopolitical and environmental considerations associated with producing SEAs.

1.3 Justification for the QMSEA project

Because of the important role information from such SEAs may also have in both commercial and financial decision making, as well as in the setting of National and State economic policy directions, it is reasonable to expect that the statistical information and “intelligence” provided by SEAs can be judged as “fit for purpose”.

Lack of a comprehensive set of quality measures for economic accounts

It appears that the quality of ABS SEAs is generally regarded well by key users. However, at present neither the Australian Bureau of Statistics (ABS) nor other National Statistical Offices (NSO) have publicly available and agreed sets of comprehensive quality measures for such systems of economic accounts.

Nevertheless ABS is conscious of quality issues and endeavours to provide available information about the quality aspects of its products. In ABS there is partial coverage of the quality issues in Concepts, Sources and Methods manuals, some Information Papers and Explanatory Notes. Where the partial coverage of quality aspects is not sufficient for users specific needs, information about quality may be conveyed on request to users by either bilateral or multilateral discussions. There is, however, a lack of comprehensive information about quality aspects generally available for established systems of economic accounts. This situation may be an issue when SEAs are the subject of extensive methodological reform and comprehensive information about aspects of quality are not available to the user or producer to assess or monitor the quality improvements brought about by such changes.

In recent years, the ASNA has been subject to a number of important changes. These have included the switch to a more updated and rational accounting framework, introduction of chained price and volume indexes, supply and use balanced integrated accounts, as well as some other novel conceptual and methodological changes. About the time of these changes three Information Papers (ABS cat. no. 5253.0, 5251.0, and 5248.0) discussed the changes and provided some information concerning quality aspects of the upgraded national accounts.

The availability of partial quality information and an absence of comprehensive quality information for both internal and external assessment purposes when required for determining fitness for use is a potential concern.

External demands regarding data quality

Acceptance of this lack of comprehensive information about quality aspects is likely to decline. Statistical users are becoming more aware of the importance of aspects of data quality for various reasons –

- There is a growing number of users, including Governments (Federal, State and Local), paying directly or indirectly for statistical information and expecting evidence of “value for money”.
- With the growing demand for more sophisticated statistical analysis there is greater need for comprehensive information about aspects of data quality so that the user can decide whether the statistical product is fit for the intended analysis.

- The socioeconomic consequences of inappropriate policy decisions based on data of quality insufficient to the task are becoming greater, as larger populations are affected and greater monetary and non-monetary resources are involved.

Metadata about quality aspects is required by users for informed decision making.

External demands regarding value for money

Also, the ABS is under increasing pressure to demonstrate that it has achieved improvements in its performance as a government agency, and in particular that it has increased both its efficiency and productivity in pursuing its declared Mission of assisting with informed decision making. Without appropriate quality measures of the key and major statistical outputs of a National Statistical Office, Government and ABS management cannot make informed decisions concerning the rational allocation of scarce resources to or within the national statistical program.

For instance, the usefulness of benchmarking indicators for determining changes in a NSO's "efficiency", "productivity", "effectiveness", "efficacy" or "value for money performance" for intra-agency and inter-agency comparisons, can be seriously limited by the absence of appropriate quality measures of its key statistical outputs.

Internal demands regarding resource allocation and product improvement

Also, in times of scarce resources and strongly competing demands, optimal internal management and governance of a NSO's many statistical programs requires that quality measures be available for its various SEAs. This information is required so that, for example, when a statistical agency is reviewing its work program:

- it can make improvements to quality aspects in the design of new processes associated with a SEA;
- it can make improvements with regard to quality aspects within an existing SEA; and
- it can assist the users of its SEAs, which can be analytical areas of the NSO itself, in making informed assessments as to the utility of the SEA product.

Comprehensive quality information assists an NSO in the above exercises because:

- its monetary cost/benefit analyses can include explicit reference to quality change, and
- the effort put into and between SEAs can be balanced according to various tensions and demands arising from non-monetary/sociopolitical considerations that are dependent on quality features.

1.4 QMSEA's approach to quality measurement

The QMSEA project takes a holistic approach to SEAs.

QMSEA's quality measures will be integrated with other systems of quality assessment being developed for systems of accounts and for the data collections that flow into SEA compilation.

Also, QMSEA will integrate with other quality regimes assessing the quality of methodologies or procedures employed in SEAs. The methodologies to be considered include seasonal adjustment, trending, temporal benchmarking, supply and use balancing and price/volume estimation.

1.5 Who are the clients for QMSEA?

The QMSEA project aims to articulate a procedure or paradigm for developing comprehensive quality measures and indicators for systems of economic accounts, which in turn can be assessed by a broad range of interested clients.

The clients of QMSEA will be both the producers of SEAs and the more sophisticated users.

Producers of SEAs may use QMSEA as an adjunct to the other quality control and improvement procedures of their SEAs, their statistical inputs, and their methods of transformation and presentation of outputs.

Although potentially appealing to a broad range of interests, it is expected that in practice these QMSEA quality measures will be accessed and assessed by a small group of specialist and sophisticated users.

In Australia this group will include senior advisers to Governments, management of the ABS, various agencies such as Treasury, Finance, Prime Minister and Cabinet, Reserve Bank of Australia, as well as other economically and statistically sophisticated regular users of the data in academia and the private sector. International users may be the non-government agencies such as the International Monetary Fund, World Bank, Organisation for Economic Co-operation and Development, and the United Nations. Also there are the influential financial market rating agencies who presently rate not only the performance of economies around the world, but also rate the quality of the statistics about the economies. For example, see "Great forgery forward", *The Australian Financial Review*, 2 April 2001, p. 29. The IMF has also reported that some users in the financial markets have already requested of it a form of Data Quality Assessment Framework that would permit a country ranking or

scoring system for data quality aspects. (See in Section 3.4, “Risks in providing summary measures”.)

The sophisticated users are motivated by a “need to know”, and are relatively better placed than others to comprehend the complex multifaceted nature of the QMSEA quality information.

On the other hand, it is thought unlikely that the casual or lay users of the statistical results of the systems of economic accounts will have either the motivation to access the relatively large bank of these quality measures, or the ability to comprehend their meaning without having to expend considerable time and intellectual effort.

1.6 Breadth of the QMSEA project

QMSEA recognises that systems of economic accounts are more complex than individual data collections, such as the survey of retail turnover.

Appendix A outlines schematically the features of systems of economic accounts that QMSEA is encompassing.

The structural elements that underlie QMSEA include:

- six streams of input data used to compile systems of economic accounts;
- twelve facets of quality, each with various dimensions; and
- three phases of SEA compilation.

Six streams of input data to SEAs

Systems of economic accounts draw upon a number of input data streams besides probability based sample surveys conducted directly by the ABS. The other data streams are:

- non-probability based sample surveys;
- censuses or complete enumerations;
- administrative or transactional by-product collections;
- market place and media intelligence; and
- the synthesis or “modelling” of some or all of the previous data streams.

The six streams of input data also come from a number of broad sources, some beyond the direct control or responsibility of the ABS. The three broad sources are the ABS, the rest of Australia (RoA), and the rest of the world (RoW).

Data sources other than the ABS may raise particular challenges for assessment of quality or standards, and/or the publication of those assessments by the national statistical office. This arises in large part because quality indicators for these sets of input data are rarely available from their source. ABS experience has shown that with

administration by-product collections, for instance, quality issues regularly arose that needed to be managed carefully to ensure the continuing release by ABS of high quality time critical SEA data.

The ABS recognises that it is important not to view administration by product collections as a simple data processing exercise. The major concerns relate to consistent and appropriate concepts and definitions, timeliness and care in compilation.

Difficulties of maintaining quality assurance with externally sourced input data can arise because of various factors, such as:

- changes to legislation. For example, a key objective of the revised Customs legislation introduced into Parliament late 2000 was to institute tighter arrangements for the release of trade data relevant to the external accounts;
- changes to government or agency policy. For example, the recent policy changes concerning the lodgement and payments associated with the Business Activity Statements have meant delays and gaps in data, though the ABS does not presently use such data to compile its SEAs; and
- changes in Information Technology. These changes can cause important operational problems in transferring, interrogating and editing data in a timely manner.

There are also issues regarding whether the degree of data sharing between various agencies is appropriate and respectful of confidentiality considerations. There have been concerns recently about whether there is a perception of administration by-product data sharing between Australian Prudential Regulation Authority (APRA), Treasury, Reserve Bank of Australia (RBA) and ABS. Federal legislation concerned with these issues is presently being drafted and may have some bearing on quality assessment issues for SEAs.

External data sources evidently raise many considerations for quality assurance and measurement, which sometimes need to be addressed by the ABS and the external source entering into explicit arrangements which include: roles and responsibilities of the respective agencies, agreement on questionnaire content and design, timely data access and transference procedures, editing and querying protocols, including whether the ABS is allowed to query respondents directly, and appropriate data feedback loops to the source agency.

Twelve facets of SEA quality

QMSEA identifies and discuss issues in connection with about twelve aspects or facets of quality associated with systems of economic accounts. They are:

- accessibility
- accuracy
- compliance
- consistency
- continuity
- frequency
- longevity
- lucidity
- relevance
- revisability
- sense
- timeliness.

The Glossary contains more detailed descriptions of these twelve facets.

The facets of quality are often interrelated and overlapping to some extent. In practice, tradeoffs and compromises need to be considered when striving to enhance one or more of these aspects of quality for a particular data item.

For instance, there may be tradeoffs between: timeliness and accuracy; accuracy and revisability; relevance and longevity; relevance and accuracy; sense for large domains and relevance for subdomains.

The existence of such tradeoffs makes any global or composite quality indicator for a SEA very problematic.

Three phases of SEA compilation

These facets of quality are meant to be appropriate, in varying degrees, to the assessment of the three phases that data flow through during the compilation of SEAs.

The three phases are:

- the input data
- the transformations of the input data
- the transformed output data and the “intelligence” generated.

Within each of the twelve (or so) quality facets there are various dimensions depending on the particular phase of SEA compilation being considered.

First phase

Some issues involving the assessment of the quality of the input data streams were discussed briefly above.

Second phase

In addition to the input data phase, a quality assessment procedure for SEAs is required to assess the quality of the second phase, which involves the various transformation methodologies that each SEA employs. This is essential as the SEA estimates are sometimes sensitive to the assumptions and nature of the methodologies employed.

For example, estimates of capital services and multifactor productivity are very sensitive to the assumptions that underlie the perpetual inventory method used to estimate the capital services.

Similarly, the valuation of employee held shares and share options as a form of remuneration is problematic and dependent upon assumptions; source data is difficult to obtain and because of this an issue is whether the valuation should be imputed for each reference period or valued at the time of realisation.

Also, the allowance for quality changes in a variety of new products and services is sensitive to the assumptions made about the "worth" of the quality changes. Improvements to quality can be in areas such as safety, durability, comfort and energy/resource efficiency, and are difficult to estimate as there is a degree of subjective judgement involved.

The method of temporal indicator-benchmarking that is used to generate quarterly series from sets of indicator series in conjunction with old annual data can have important consequence. The quality of the results depend on the level of disaggregation at which the methodology is applied. (Cainelli and Lupi, 1999). Different price and volume estimation methodologies can also have significant impacts on the key estimates of SEAs as can the seasonal adjustment and trending methodologies employed. All of these types of transforming methodologies used by SEAs are to be evaluated by QMSEA.

Third phase

Unlike a particular data collection quality assessment, a SEA quality assessment has a diverse range of outputs to evaluate in the third phase. Systems of economic accounts invariably produce statistics in seasonally adjusted and trend from as well as original form. These forms of the data relate to flow and stock variables, as well as combinations of these distinctly different variables. For example, GDP per capita is a

composite indicator constructed of a flow variable in its numerator (GDP) and a stock measure in its denominator (population at a point in time). Consequently variables of this nature, referred to here as “flocks”, can have quality attributes different to their antecedents. All these variables also cover a variety of economic attributes, such as current monetary values, chained volumes, physical quantities, price indexes and implicit price deflators.

A wide range of variable types

It is also important to note that these SEA data are expressed as one or more variables in the form of levels, changes in levels, percentage changes, and ratios of various variables. This diversity of output variables from SEAs adds an additional degree of assessment responsibility to QMSEA not generally borne by other particular data collection quality regimes. This aspect is important to note, because although quality measures from a particular data collection process may appear acceptable to a user for a particular data item (usually in raw form), their eventual transformation through a SEA into, say, derived seasonally adjusted and chained volumes, etcetera, may alter materially their “fitness for use”.

Also, the aspects of quality may vary between related forms of a variable. For example, a quarterly percentage change of a particular data item may be assessed as having such and such a degree of accuracy, whereas its related level form could be less accurate because the errors in the level estimates are known to be appreciable but of a fairly constant proportional nature. In this example the proportional errors of the level estimates cancel out in the percentage movement estimates. Similar considerations apply to the other variable types.

QMSEA is to address these types of quality considerations because users’ needs vary between SEA types and various analysis applications. For example, in the annual national accounts it can be the current dollar level estimates per annum that are of interest, whereas in the quarterly national accounts it is the quarterly percentage movements of the chained volume seasonally adjusted data item that is of primary concern.

Beyond sampling errors

In developing a comprehensive suite of quality measures for a system of economic accounts, it is recognised that “sample survey standard error” is associated with only one of the input data streams to systems of economic accounts; the probability sample survey based results. Non-probability based or purposive surveys such as used for the Consumer Price Indexes (CPI) or Producer Price Indexes (PPI), which feed into the system of national accounts, do not have associated with their results a quantifiable sampling standard error. Nor do the other input data streams. For quality assessments of systems of economic accounts the role of sampling standard

error is a relatively minor one compared with that of non-sample errors. This is because there is greater potential for non-sample errors to be more prominent factors in SEAs than sampling standard errors. Further, the sampling standard errors' importance in the exercise of informing the user about the overall accuracy of a system of economic accounts is expected to decline in importance in the future. See Box 3.

BOX 3 – THE NEED TO LOOK BEYOND SAMPLING ERRORS

The relative decline in importance of “sampling standard errors” is expected for a number of reasons.

Firstly, issues of provider load, emerging opportunities and continuing tight budgets will mean less reliance on sample surveys by economic statisticians and a growing dependence upon administrative by-product or transactional data sources. The increasing use and reliance on administrative by-product and transactional data, like the Australian Tax Office's Business Activity Statements (BAS), EFTPOS and “scanner” data, is expected to increasingly replace various ABS conducted probability based sample surveys. These input data sources/sets will inevitably be imperfect from a conceptual and compilation perspective, and will provide difficult challenges because the e-commerce based transactions datasets will be huge. (Edwards, 2001, paras. 11 and 31) Consequently, the source and significance of sample standard errors in a suite of quality measures for SEAs is expected to decline in a relative sense.

Secondly, there is an increasing realisation and awareness that the “sampling standard error” is only one of a number of quality aspects of a probability based sample survey estimate, and that it may not be the most important aspect simply because it may be more easily estimated or “given a number” than the other quality indicators associated with the a probability based sample survey results. Simply put, users are becoming aware that the sampling standard error is not a guide to the total unknowable degree of accuracy.

Thirdly, with increasingly complex compilations of various input data streams in SEAs, and transformations into constant price or volume measures and seasonally adjusted or trend aggregates, sampling standard errors for such statistics become either irrelevant, problematic, or too costly to compute for systems of economic accounts.

1.7 QMSEA's distinctive focus

QMSEA focuses on:

1. designing for a relatively well developed and mature economy a comprehensive set of quality measures for assessment of economic accounts produced by a statistically sophisticated national statistical agency, such as the ABS. QMSEA will not be probability sample survey-centric;
2. a system for monitoring developments over time of such quality measures within a single country, rather than for inter-country comparisons. In this respect, the project will complement the International Monetary Fund's various quality projects covered under the auspices of the Data Quality Assessment Framework. The DQAF is discussed in some detail later;
3. the Australian System of National Accounts (ASNA) as its primary case study, but should be applicable to other systems of economic accounts, such as the Balance of Payments and Government Finance Statistics; and
4. aspects of economic accounts' quality that should be of interest to the more sophisticated users, such as the Government, Treasury, Reserve Bank of Australia, other international NGOs and similar NSOs.

1.8 Outputs from the QMSEA project

Because of the large quantity and complex nature of the information concerning quality indicators, it is envisaged that the QMSEA assessment information would be banked, archived and distributed electronically. See Box 4.

To support a free ranging interrogation procedure of the type described in Box 4, large banks of quality information may need to be collected and arrayed. Such an assembly of information is here called the quality matrix. A potential concern is whether it is feasible and necessary to fully populate the quality matrix. There is concern about the time, effort and opportunity cost, and resources required to be borne in an attempt to populate the quality matrix. This question is not easy to answer without the insight from trials. Also, the answer will be partly determined by what is considered to be the primary aim of QMSEA. This issue is discussed later in Section 3.3.

BOX 4 – ELECTRONIC DISSEMINATION OF QMSEA'S QUALITY MEASURES

Electronic access to QMSEA information should permit the enquirer to trace the quality audit trail in many notional directions. For instance, the enquirer should be able to:

- search vertically, in the sense of “drilling down” to more detailed levels of a particular aggregate’s component information;
- “pan horizontally” in the sense of tracing the quality audit trail through various components of the indicator at a particular level of aggregation;
- follow either of these views over consecutive reference periods, or for a particular reference period over time as it is re-estimated.

To appreciate how this quality search might be performed consider the fundamental supply and use relationship of the system of national accounts. It can be expressed as:

$$O + T + M = C_i + C_f + GFCE + cIn + V + X$$

where supply is composed of output (O), taxes less subsidies (T), imports of goods and services (M) respectively and equals use. Use is in the form of intermediate consumption (C_i), final consumption (C_f), gross fixed capital expenditure (GFCE), changes in inventories (cIn), acquisition less disposal of valuables (V) and exports of goods and services (X) respectively.

The user should be able to trace the quality assessment of anyone of the components in the above identity, or may select an item like output and investigate its components by considering dissections such as industry, sectors, or products. Such an enquiry may additionally select a particular reference period and monitor how the quality measures have varied over time. Alternatively, the user may select a string of reference periods and observe how the quality measures have changed over this analysis span.

Such quality assessment information might also be made available internationally via the presence of a hyperlink, allowing users to move directly from, say, the IMF bulletin board to the ABS website(s). Such types of arrangements, however, are not free form organisational complications or difficulties.

2. QMSEA'S RELATIONSHIP TO OTHER QUALITY MEASUREMENT SYSTEMS

In relation to other quality assessment regimes in the ABS, other NSOs and NGOs, QMSEA differs in some important respects. QMSEA aims to:

- be more comprehensive and detailed in its quality assessment, and will not concentrate on standard errors;
- not be sample survey-centric – it will also consider the five other data streams flowing into SEA compilation;
- be suitable only for regular sophisticated users and producers of SEAs and not for casual or lay users;
- have broader application than just data collections by considering the effects of transformations; and
- be applicable to the broad variety of data output from SEAs and not just a single data form.

2.1 Development of international quality standards

The search for universally agreed and accepted quality statistics has been frustrating. De Vries (1999) recently observed:

“Another example is the Mahalanobis Committee, created by the International Statistics Institute in 1995. Its aim was to develop ‘statistics about statistics’. There have been no results so far, the reason being on one hand a total lack of interest in participating in the committee’s work, and on the other hand widespread disagreement about how to tackle the issue.”

De Vries concluded:

“After all, I think there is some irony in the fact that while statisticians are constantly trying to agree in great detail which internationally comparable information (in terms of definitions, classifications, other methodologies etcetera) to ask from business, institutions and households, they do not wish to agree on measurement of their own operations, and are apparently unable – up to now – to agree on universally accepted definitions of concepts such as non-response or indeed statistician.”

Over the last decade there has been growing interest amongst NSOs in developing various systems for measuring or attempting to assess the quality of either particular data collections or systems of economic accounts. An ABS “quality” policy was originally approved by the ABS Division Heads Meeting in February 1988. (ABS, 1992)

In this context, the term “data collection” refers to a particular subset of macro-economic data, such as capital expenditure, retail turnover or labour force statistics.

The term “system of economic accounts” refers to large sets of integrated accounts, such as the national accounts or balance of payments, etcetera.

Some of the recent attempts at developing quality assessment systems strive to be more systematic and comprehensive than the earlier attempts. And some have been very ambitious. See Box 5. The IMF’s present project concerning quality systems, the Data Quality Assessment Framework (DQAF) is one of the latter type, and is discussed briefly later.

BOX 5 – EVOLUTION OF THE INTERNATIONAL QUALITY FRAMEWORKS

It is not possible to nominate a definitive date or agency as being the starting point or instigator of the present movement for quality information. However, one notable example of an agency that spelt out broad quality considerations is the Office of Budget Management, USA, in its Statistical Policy Directive No. 3: “Compilation and Release of Principal Federal Economic Indicators”. The directive, issued 25 September 1985, gave guidance to federal USA agencies on the compilation and release arrangements for economic indicators. No previous watershed has so influenced many quality features of a nation’s statistical agencies and their systems of economic accounts. The directive’s intent was:

“... to ensure that the Federal data and estimates used to assess current economic conditions meet high standards of reliability and usefulness and that agencies release them in a fair and orderly manner.” (Waite, 1995, p. 3)

In addition to adding a performance evaluation every three years, the directive also included stringent procedures for announcing changes to data collection, analysis and estimation methods.

In the early 1990s there were various attempts by NSOs to assess the quality of key national account aggregates by studying their revision history. ABS has subsequently published a number of revision history analyses. (ABS, 1996; Rossiter, 1996; Webster, 1998) Such study can shed light on whether there are serious biases in the results, and whether source data or methodologies are contributing more or less to the estimates revisability. While shedding some light on one aspects of quality, this approach was recognised as addressing only part of a broader key question of whether the data are reliable, or fit for use. It was acknowledged that the absence of revision does not necessarily mean that the data are accurate, because a wrong or less than accurate number could remain unrevised. Also, in some instances the ability to revise data is constrained by

various factors. For instance, as a result of the way the CPI is compiled, and because of the manner it is used for inflation indexation in contractual and social security type arrangements, revisions to the initial CPI estimates do not occur. This situation has prevailed even though aspects of the index methodology employed for the CPI were known to be biased.

Associated with the interest in revisions is an interest in accuracy. Accuracy is concerned with the proximity of an estimate to the ideal or true but unknown value of that component. There is a natural or instinctive desire to know how accurate the data are, but unfortunately the nature of systems of economic accounts, like the national accounts, balance of payments and government finance statistics, makes it extremely difficult to ever have a tangible benchmark against which to measure accuracy. Nor is there, for these accounting systems, a statistical theory to appeal to so as to produce a quantitative measure such as “sampling standard error” for the key outputs of such systems. It is important to note that the true value is never known, and that in practice there cannot be an overall measure of accuracy or total error. Consequently, accuracy of SEAs is in practice evaluated by considering the potential sources of error and considering whether they have been minimised optimally.

In 1997, Statistics Canada considered a strategy for developing quality assessments statistics for the Provincial Income, Production and Expenditure System of accounts (PIPES). It was observed that:

“Meeting this goal will be one of the major objectives of Statistics Canada over the next few years. Unfortunately, the current absence of quantifiable measures of accuracy makes it difficult for the bureau to decide on which components are the most critical for improving the reliability of the provincial accounts. We desperately need yardsticks to help us measure reliability and quality.” (Statistics Canada, Unpublished internal memo, April 1997)

And, the desire to have a measure of accuracy is still strong in some agencies. This is indicated by the European Court of Auditors recently seeking international assistance in developing error margins or measures of accuracy for key national account aggregates for the 15 Member State economies in the European Union. The Court of Auditors describes itself as the “financial conscience” of the Union, and needs to monitor for fraudulent practices in the preparation and presentation of the systems of economic accounts of member countries, and in the stewardship of the allocation of financial assistance to member countries based on their reported national accounts. However, no statistical methodology is presently available to deliver that result concerning accuracy.

In the mid 1990s, the International Monetary Fund reacted to a number of economic/financial crisis and instances of serious misreporting that threatened its

effectiveness and credibility. Fearing that its ability to meet its responsibilities for surveillance of members' economic policies and management of the IMF's loan program was being adversely affected by poor quality data, it started to develop a quality reporting system that looked more broadly than just aspects revisability and accuracy. An overview of this work is found in "Towards a Framework for Assessing Data Quality" (IMF/Carson, 2000). Their present work complements the quality aspects of the IMF's earlier Special Data Dissemination Standards (SDDS) and General Data Dissemination Standards (GDDS). In recent years this quality assessment work has increased in intensity, with the IMF adopting a development process for the quality framework which has been consultative with various NSOs and iterative in its evolution. Their work in this area is far from finished, though it is relatively well developed compared to that of various individual NSOs.

In addition to the IMF's first specific data quality framework drafted for the national accounts last year (June, 2000), other specific frameworks have been drafted recently for the balance of payments, the analytical accounts of the central bank, the producer price index, and government finance statistics. Progress in developing such frameworks as DQAF or QMSEA is, however, slow and arduous because construction of a coherent and comprehensive system is difficult in a field that is conceptually and practically difficult, very large and complex.

2.2 Role of international standards

A feature of the IMF quality framework DQAF is that there is a relatively close mapping to some existing international statistical standards, concepts and manuals. For example, the 1993 System of National Accounts and the fifth edition of the IMF's Balance of Payments Manual are used as benchmarks for definitions, concepts, classifications and valuation methodologies. ABS generally complies with these standards and so the IMF quality framework provides a basis or foundation on which to build a more comprehensive quality assessment system for the ABS's economic accounts.

There are sound reasons for generally complying closely with international standards, which have positive impacts on aspects of quality. For instance, the statistics from different countries are more comparable. This may be very important from a relevance perspective, particularly for those users interested in comparing Australia's economic performance with other countries. This consideration may be so important as to outweigh the qualitative disadvantages of following an international standard. Also, it may be possible to have a SEA with a "dual" basis, thereby providing users with different views of economic activity, and satisfying different needs.

BOX 6 – THE SNA 1993 STANDARD FOR NATIONAL ACCOUNTS

SNA 1993 (which was implemented by the ABS in late 1998) was very different from its predecessor, SNA 1968.

It was changes in the structure and nature of the economy, the increasing sophistication and growth of financial markets and their instruments, emphasis on the interaction of the economy with the environment and other considerations, such as a need to clarify and simplify the prevailing accounting system, that indicated a need to update the SNA.

The task of modernising SNA commenced in the mid 1980s, and the new version was released under the auspices of the Commission of the European Communities (now Eurostat), the International Monetary Fund, the Organisation for Co-operation and Development, the United Nations and the World Bank in 1993. Until the implementation by ABS of SNA 1993 in 1998, the system used through the 1990s was based on the conventions and practices prior to 1968 and evidently not up to date.

Recently there has been much talk about the so-called “new economy”.

“The term New Economy refers to a set of qualitative and quantitative changes that, in the last 15 years, have transformed the structure, functioning and rules of the economy. The New Economy is a knowledge and idea based economy where the keys to job creation and higher standards of living are innovative ideas and technology embedded in services and manufactured products. It is an economy where risk and uncertainty, and constant change are the rule rather than the exception.” (Edwards, 2001, para. 22)

Questions may therefore be raised about how well SNA 1993 provides a framework for assessing the macro-economic consequences of the so-called new economy.

In the mid 1990s Waite said:

“More seriously, I believe that by most criteria US economic indicators meet or exceed reasonable criteria for timeliness and also meet those criteria for reliably measuring short-term economic change. This, however, is quite different from saying that our statistics are keeping pace with longer run forces shaping the US, indeed the world, economy. Our economies are changing faster than our ability to measure them. Economic output is increasingly conceptual rather than physical. The form of output and the means of production have been increasingly less physical and tangible, hence more difficult to measure. ... This trend is sure to continue into the 21st century.” (Waite, 1995, p. 10)

In Australia, as elsewhere, Waite’s observations are pertinent; commodities and industries grow at different rates, and new products come onto the market and old ones leave on a regular basis. It is therefore important that our SEAs are flexible enough to keep pace with the change.

Australia's implementation of SNA 1993 reflects local conditions and requirements, with isolated instances of departure from the standards because of strong user preference for an alternative view.

“The departures are relatively minor and, consequently, they do not affect the comparability of national account information reported by the ABS to international organisations such as the UN and the OECD to a significant extent.” (ABS cat.no. 5216.0, 2000, p. 8)

Refer to Box 7 also.

However, there are some concerns associated with attempting to base a quality assessment system solely around existing international standards. International standards are not necessarily monolithic, homogeneous, consistent, generally complied with, integrable, or best current practice, as discussed briefly below.

Internationally accepted statistical standards can be useful, but they are not always the currently best available practice. For instance, consider SNA 1993, which is the present standard adopted by the ABS for its national accounts. See Box 6.

Unlike DQAF, one aim of QMSEA will be to explicitly assess and review whether the SEA methodologies and basis are relevant or appropriate for the present and foreseeable future circumstances of Australia. The QMSEA philosophy is that the quality of a system of economic accounts should be measured and judged with reference to the cognitive purpose of the system of economic accounts, not solely against some generic international standard about which a system of economic accounts might be based. QMSEA will not automatically assume an international standard is necessarily the best or appropriate benchmark for the above reasons and those discussed in Appendix D.

Although not hidebound by generic international standards just because they exist, QMSEA:

- will concord with DQAF where possible;
- will extend DQAF for statistically sophisticated countries and users; and
- may be used by the ABS to influence international standards.

While many countries of the world have expressed their intentions to produce their statistics in an SNA 1993 framework and format, this by no means guarantees that their data conform to the SNA 1993 standards. Implementation by NSOs of international standards like the SNA 1993 tends to be selective and judgmental.

“Without some assessment of the quality of the data, which is usually difficult in practice, the mere presentation of the data in the right format may be no more than 'window dressing' to satisfy the demands of the agencies concerned.” (Hill, 1999, p. 1)

As indicated earlier the ABS has undertaken to implement SNA 1993 as far as practicable. Australia has probably gone further than almost any other country toward implementing the full standard. See Box 7.

BOX 7 – ABS COMPLIANCE WITH THE SNA 1993 STANDARD

At the request of the ABS, Professor Peter Hill (the principal author of the SNA 1993 manual) evaluated the ABS implementation of the standard. His conclusions are summarised below.

ABS produces both regular releases of annual national accounts, annual state accounts and quarterly national accounts on an SNA 1993 basis. With regard to the annual national accounts Prof. Hill has stated:

“The set of annual accounts published by the ABS in April 1999 seem to be one of the most complete sets of accounts on a 1993 SNA basis yet available in the world. The more or less complete set of sectoral accounts consisting of income, capital and financial accounts plus balance sheets for all sectors of the economy (except NPIs serving households) represents a comprehensive implementation of the SNA which is remarkable for the inclusion of sector balance sheets which very few countries have been able to compile up to now. The accounts also incorporate the new supplementary accounts showing ‘adjusted’ disposable income and ‘actual consumption’ for households and government, concepts introduced for the first time in the 1993 SNA to which considerable importance was attached in the revision of the SNA.” (Hill, 1999, p. 9)

These annual national accounts also incorporated data relating to the capital stock and multifactor productivity measures, which previously had been published separately. In addition, this comprehensive system of national accounts was also fully consistent with the supply and use and input-output tables that ABS published the month before. This closer integration of both the input-output data and capital stock data (the latter albeit experimental at this stage) with the compilation of the main national accounts was strongly recommended in SNA 1993. This is recommended because it tends to improve the quality of all the constituent datasets within the SEA by confronting and potentially resolving inconsistencies which are indicative of errors in one or more of the component subsets of data.

2.3 Leadership in setting standards

The favourable, informed and authoritative assessment of ABS’s implementation of SNA 1993 (Box 7), has helped establish ABS credentials for promoting world best practice for adoption in international standards and the improvement of SEA quality. These ABS improvements are not inconsequential for any consideration of SEA quality. See Box 8.

BOX 8 – ABS LEADERSHIP IN ECONOMIC ACCOUNTING

Examples in regard to the national accounts are the treatment of the output of financial institutions services indirectly measured (FISIM), the use of annually re-weighted chain indexes in preference to less frequently re-weighted indexes for the measurement of price and volume changes, and the upgraded estimation of the stock of capital and related statistics.

As to capital stock estimates, the ABS approach figures prominently in a recently published OECD manual concerning capital stock and productivity, and is given as an example of a conceptually superior method. This methodological improvement should strengthen the links between the flow accounts and balance sheets of the SNA. That improvement should also assist with better estimates of the consumption of fixed capital and thereby better estimates of Net Domestic Product (NDP). The provision of good quality estimates of NDP and GDP for the economy may be a very significant advancement for analytical purposes and policy intervention. In this regard QMSEA provides a medium through which the ABS can gauge weaknesses in methodologies in ASNA/SNA 1993 and other SEAs, and thereby help indicate areas where improvements have been or should be made.

Some other areas for further quality assessment development and leadership by the ABS are chain linked price and volume methodologies, revision analyses, and the seasonal adjustment and trend estimation methodologies applied to the key quarterly aggregates of the systems of accounts.

As to trend estimates, Australia is one of the few NSOs (probably the only one) to give prominence to quarterly trend estimates from SEAs for the purpose of analysis. For example, in the Explanatory Notes of its National Income, Expenditure and Product publication ABS states:

“Given the qualifications regarding the accuracy and reliability of the quarterly national accounts, the ABS considers that 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.”

ABS has a preference for influencing international standards, general statistical standards, economic accounting standards, and quality standards, rather than launching off on completely disjoint efforts. This is shown by the participation of ABS in various international forums. ABS has shown statistical leadership in a number of important areas and has had a good deal of influence on System of National Accounts, Balance of Payments, System of Economic and Environmental Accounts, prices manuals, etcetera. For further details refer to Appendix D – QMSEA and International Standards.

2.4 QMSEA and the IMF's Data Quality Assessment Framework (DQAF)

The IMF's work on quality frameworks has the strong support of the ABS. This is because the ABS regards quality assessments of its statistics and methods as extremely important, both to determine areas that are deficient so that improvements can be made, and to assist users in their understanding of the statistics and with the more effective use of them. The ABS Corporate Plan 2000 states: "We are also open about the quality of statistics, so that users can better understand and interpret them."

ABS also supports the DQAF because of the transparency it may provide to other countries SEAs and statistics.

It is expected that QMSEA will draw upon the IMF framework where appropriate, modifying and generally extending and deepening the aspects of quality assessed in each of the systems of economic accounts, to suit local conditions. This approach to the IMF's DQAF is feasible because their assessment frameworks presently give room for flexibility to take account of the various individual country's circumstances. A prescriptive "one size fits all approach" was discouraged by the IMF for various technical and non-technical reasons.

3. IMPLEMENTING QMSEA

As discussed above, systems of economic accounts like the Australian System of National Accounts can be very large, complex and comprehensive sets of time series data, which are the result of various sophisticated transformation methodologies. Developing and implementing a quality assessment procedure for such SEAs is not therefore a simple or straightforward task. Given this situation with SEAs it is intended to trial QMSEA on subsystems. The following strategies for implementing QMSEA are being considered.

3.1 Agreeing on quality criteria

A suite of quality indicators will be defined and described for the three phases that data pass through in an SEA compilation. This proposed suite of indicators will then be discussed with a selection of the target audience. Here it should be remembered that the QMSEA audience is considered to be a relatively small group of statistically sophisticated and aware producers and regular users of SEAs. The aim is to agree upon a suite of quality indicators that are comprehensible and comprehensive for the task of assessing quality in the many diverse situations SEAs are to be used. Preferably, the quality indicators should not be ambiguous, and as much as possible they should be orthogonal to each other, in the sense that they individually capture one feature of quality not represented to any significant extent by another indicator.

For example, including in the suite a quality indicator referred to as “reliability” may seem intuitively sensible, but in practice the term “reliable” is ambiguous. The term “reliable” is thought by some people to refer to aspects of “accuracy”, while for others it is thought to relate to aspects of data “revisability”. The ABS now prefers the term “revisability” to “reliability” in its discussion of quality aspects. The term “reliability” in the QMSEA context means neither of the above indicators, and takes on a global composite meaning. Here it refers to the degree that an estimate or piece of SEA information rates against all of the facets of quality, not just the single facet of, say, accuracy. That is, an estimate is said to be “more reliable” if it rates more highly against the suite of QMSEA criteria than another estimate.

3.2 Testing QMSEA on subsystems of the economic accounts

Before attempting to implement QMSEA on the gamut of economic accounts, we would wish to undertake some small–medium scale “proof of concept” studies.

There is a need for the exercise to reasonably challenge the features of the procedure without, however, overwhelming its development with too much complexity or sophistication. The case studies should also be in areas where interest in the results is

likely to be more than just academic. And sufficient quality indicator information should be relatively easy to obtain or generate during the “proof of concept” stage.

The large ASNA may be broken into various smaller segments for testing. For example, one of the specific core accounts might be selected. Alternatively, a principal aggregate might become a specimen for investigation. Besides parts of the core accounts there are the satellite and social matrix accounts to consider. Box 9 suggests some segments of the system of national accounts that may be fruitful candidates to trial QMSEA on.

BOX 9 – POSSIBLE TESTBEDS FOR THE QMSEA CONCEPT

The recently upgraded capital stock and multifactor productivity estimates are an important improvement of the ASNA/SNA 1993. These estimates have been the subject of a feature article that has said:

“The ABS is firmly of the view that the upgraded capital stock and MFP estimates are significantly better than those previously published. Nonetheless, the estimates, particularly those for capital services and MFP, are very sensitive to the assumptions that underlie them. For this reason, it has been decided to label the new estimates of capital services and MFP as ‘experimental’, pending a user review of the methodologies.” (ASNA 1997–1998, ABS cat. no. 5204.0, p. 8)

Because of the importance of these estimates for economic analysis, their experimental nature, and pending review, this subdomain of the ASNA may be an ideal set of data on which to pilot test QMSEA.

Subjective accuracy ratings are published by the ABS for principal national accounts, balance of payments and international investment position aggregates. Selecting, say, one aggregate from each of the four subjective rating categories (good, fair, poor, very poor) and applying the QMSEA quality criteria may prove to be informative and helpful in reducing the apparent degree of subjectivity in the present ratings. However, because these are principal aggregates the selection will need to be made carefully to ensure that the task is not overwhelmed by the complexity of following the quality audit trail back through too many data transformations and amalgamations of different input data streams. An example set could be the chained volume estimates for Household Final Consumption Expenditure (rated Good), Government Final Consumption Expenditure (rated Poor), Public authorities Changes in Inventories (rated Fair), Private non-farm Changes in Inventories (rated Poor), and Farm Changes in Inventories (rated Very Poor).

In principle, one of the core accounts of the annual national accounts, such as the production account might be considered. However, as in the case of selecting too high an order aggregate, this exercise may be overwhelmed by the complexity of following the quality audit trail back through too many data transformations and amalgamations of different input data streams.

With regard to satellite accounts the ABS has developed and published only one such system, the Tourism Satellite Account 1997–1998 (TSA). Because its development has occurred recently qualitative and anecdotal information about aspects of quality may still be fresh in the memories of the producers, and consequently using this subsystem as a case study may be a valuable means for recording this information before it is lost from corporate memory. Presently the TSA publication does not discuss aspects of quality for this dataset in any detailed or specific sense; about one page deals with general aspects of the TSA's quality. Another potential advantage of applying QMSEA to TSA is that there is interest in repeating the exercise for another reference period, and a quality assessment may contribute to improvements in the next round of estimates, which are likely to be part user funded. Because of the “youthfulness” of the TSA 1997–1998 and the fact that its dataset relates to only one reference period (1997–1998) some of the QMSEA quality criteria are not pertinent, such as revisability, longevity, etcetera. However, as a matter of course it is thought sensible to apply QMSEA during the development stages of any of the next sets of satellite accounts. Applying a quality procedure formally during the development stage will involve some effort over and above that which is expended anyway when informal assessments about various aspects of quality are made in initially setting up these satellite accounts. However, proceeding formally with quality assessment during development stages may be cheaper in the long run than effectively repeating the quality exercise retrospectively.

Presently the ASNA does not have a formal Social Accounting Matrix (SAM) associated with its core national accounts. However, the Income, Expenditure and Housing Section of the ABS have estimated household balance sheets by age class and socioeconomic group. This work is expected to be ongoing, so that time series data can be developed for comparative purposes, and so it is a candidate for QMSEA pilot testing for reasons similar to those mentioned in relation to the Tourism Satellite Accounts 1997–1998.

Finally, there is being developed by ABS a major pseudo social accounting matrix known as the Measuring Australia's Progress (MAP) project. This is a very interesting collection of data which presents principal indicators from the economic, social and environmental sectors for consideration in topical debate. MAP is not, however, strictly a social accounting matrix, because it doesn't attempt to link its principal aggregates in some formal causal manner. However, the fact that MAP is not a SAM doesn't mean it shouldn't have a quality assessment. What is important here is that QMSEA has not been developed to assess the quality of systems dealing primarily with social or environmental activities. The MAP project is therefore not considered to presently be an appropriate candidate for case study.

3.3 Assembling the quality indicators

Once the case studies have been selected for QMSEA testing, the various quality indicators appropriate to each system will need to be assembled. Depending on the particular case study this exercise will progress with differing degrees of ease. For those case studies that are primarily dependent upon ABS collected input series and transformation methodologies, the task of collecting and developing quantitative, qualitative and descriptive quality indicators is expected to be easier than for case studies dependent upon many input data streams not under ABS direct responsibility.

However, to support a free ranging interrogation procedure of the type described in Box 4, large banks of quality information need to be collected and arrayed. Such an assembly of information is here called the quality matrix. A concern is whether it is feasible and necessary to fully populate the quality matrix. There is concern about the time, effort and opportunity cost, and the amount of resources required to be borne in an attempt to populate the quality matrix. This question is not easy to answer without the hindsight from trials and is partly determined by what is considered to be the primary aim of QMSEA.

If the quality matrix is not sufficiently populated there is concern as to whether an informed judgement can be made about the “fitness for use” in various applications. For example, if a principal SEA aggregate is a complex function of many variables its consequent quality may not be gauged or measured without knowing:

- the quality attributes of most of the substantive component variables;
- the salient features of the complex function that transforms the component variables; and
- the conditional assumptions and judgements which constrain the two above elements.

Axiomatically, ignoring trivial variables, trivial features of the complex function, and trivial assumptions should not impact adversely upon the exercise of producing quality indicators for the principal aggregate. But in practice determining what is trivial is not always clear cut in differing circumstances and given the variety of uses of the statistical aggregates.

To some extent, how many cells should be filled in the quality matrix will be determined by what purpose primarily drives the adoption of QMSEA. For instance, satisfying a high-end Treasury user’s attempt to determine the quality difference between, say, quarterly percentage movements of seasonally adjusted chained volume GDP or NDP will probably require the data matrix be populated differently to satisfying an internal ABS management enquiry as to where to more cost effectively spend the budget on quality improvement of the NSO’s various SEAs.

It should also be noted that there are differing degrees of difficulty or ease in populating the quality matrix according to which facet and or dimension is being considered, and for which SEA or data item. Some metadata concerning facets or dimensions of quality will be common to all SEAs with only some exceptions. Here this quality metadata is referred to as global. By its nature much of this global quality information will be descriptive. The definitions, descriptions and relationships of facets of quality are examples of global metadata. Similarly, some of the quality metadata will be common to data items within a particular SEA, but may differ between various SEAs. Here this type of quality metadata will be referred to as SEA specific. For example, metadata regarding quality aspects such as accessibility and timeliness will generally be a common denominator within a SEA, and will also be descriptive. On the other hand some metadata concerning quality aspects will be data item specific. For example, aspects associated with accuracy, revisions, longevity, continuity, compliance and relevance will be conditional on the data item, and whether it is:

- original, seasonally adjusted or trend;
- stock, flow or “flock”;
- level, movement, percentage movement, ratio, index number; and
- dollar value, quantity, chain price or volume, etcetera.

This metadata will tend to be statistical as well as descriptive.

There will be a degree of evolution and modification of various aspects of the quality indicators in the pilot phase. This is expected to occur as comprehension increases as to how aspects of the quality attributes of the input data change as it is compiled and transformed into the final aggregates. It is expected, however, that for some SEA assessments various quality indicators will have less than complete information and will consequently indicate that “information is unknown” or “unavailable”, or is subject to a number of caveats. This feature is expected to be more common to the facet of overall "accuracy" of many data items, both input and output. However, a knowledge of this factual, albeit lame situation may still be helpful in judging how SEA statistics or pieces of “intelligence” should be regarded for use in a particular application.

3.4 Information issues and probity

Electronic storage of the QMSEA quality measures

It is the medium term goal of QMSEA to assemble, store, manipulate and access the quality metadata via an online e-databank. This approach to the knowledge management is recommended because the quantity of the metadata concerning aspects of quality, the need to update it in an irregular ad hoc fashion and the need to be able to retrieve and interrogate it in many different ways precludes hard copy storage and distribution as an appropriate medium.

Presently some quality indicators for some ABS data collections are stored in various ABS e-facilities, such as the Collection Management System and ABS Database. However, this coverage is by no means comprehensive with respect to SEAs. After user acceptance testing of the proposed flexible interrogation procedures (Refer above to Section 1.8 – Outputs from the QMSEA project) the existing e-facilities will require extensive development if QMSEA is to be promulgated for the gamut of SEAs and made available to the key external users. The development by ABS of a new input database warehouse may have an important and timely role to play in this area of QMSEA implementation.

A summary of QMSEA measures for the lay user?

There is a view that the quantity of information about aspects of quality in each of the large systems of economic accounts will be overwhelming for the general users of statistics, particularly those not making regular or intensive use of the accounts. Even for the sophisticated users there will be the issue of whether the amount of information concerning quality aspects is overwhelming. The question therefore arises as to whether the information about quality aspects should be summarised. At Appendixes B and C there are examples of draft Summaries of the IMF's Data Quality Assessment Framework. Appendix B is referred to as the "lite" version of a DQAF. To the above there is a counter view that such summaries are too superficial to be helpful, and that important weaknesses in SEAs may be hidden under the gloss or veneer of summary information. This aspect is discussed briefly later.

Risks in providing summary measures

There is also the issue and risk that highly summarised or global composite indicators of SEA quality will encourage finance analysts to assign performance rankings to these types of quality measures, with unwarranted and unfavourable consequences. The IMF has reported that some users in the financial markets have already requested of it a form of DQAF that would permit a country ranking or scoring system for data quality aspects. The IMF has responded by claiming that:

"However, the data quality assessment framework does not lend itself to such an approach. The element of subjectivity inherent in the frameworks, the detail embedded in the dataset specific frameworks, and the great diversity of country circumstances largely preclude using them to make meaningful country rankings." (IMF/Carsons, 2000, para. 37 p. 15)

I doubt whether such an explanation will satisfy or inhibit the financial analysts from their desire to have a simple rating, and I'm not an advocate of the summary, "lite" or composite indicator approach to QMSEA quality assessment.

BOX 10 – HOW MUCH DETAIL IN THE QUALITY MEASURES? AN ILLUSTRATION

The difficulty of deciding how much detail is appropriate for quality assessment can be illustrated by considering the principal economic indicator:– quarterly percentage growth of the seasonally adjusted chain volume measured Gross Domestic Product. This version of GDP is clearly one of the most complex, composite and synthetic statistical measures of economic activity. How then should the quality of this key indicator from the system of national accounts be described? Given this statistic is a high order aggregate that is the result of many data input streams, that are in turn transformed by both an elaborate seasonal adjustment methodology and a complex chain linking volume methodology, does its nature defy being described as simply either “good”, “fair” or “poor”?

Further, is Gross Domestic Product (GDP) or Net Domestic Product (NDP) the relevant measure for analysts to focus on now and for the new economy? How should the QMSEA measure of quality, in particular “relevance”, attend to this issue summarily? Consider the issue briefly. The term “Gross” in Gross Domestic Product indicates that the estimate includes the value of fixed capital consumed. On the other hand, NDP is derived by subtracting from GDP the consumption of both tangible and intangible fixed capital in the production of Domestic Product for the period considered. Compared to GDP the NDP measure may be the more conceptually appealing and satisfying measure of economic activity for analytical purposes.

Although it may be argued that NDP is a better quality indicator than GDP, because it is more relevant or elegant for economic analysis, not all the other quality aspects are equal between these two important measures of macro economic performance. Because the estimation of the consumption of fixed capital is problematic GDP is thought to be generally the more accurate measure compared with NDP; GDP can be estimated in principle from three independent sources. However, it should be acknowledged that presently a significant gap in the source data for quarterly national accounts is capital expenditure on computer software and that this deficiency has implications for the accuracy of both measures of Domestic Product. In the new economy this is a large and growing component of Gross Fixed Capital Expenditure, and therefore a problematic area for GDP as well as NDP with regard to the value of fixed capital consumed.

There are a number of important quality issues to consider in this example. Evidently, making an informed decision between these two indicators with regard to “fitness for use” requires comprehending more than just a composite summary quality indicator.

One of the challenges in assembling and presenting the information about quality is ensuring that the aspects in which a user is interested or should be aware of, are conveyed so that the user can decide whether the statistical output is fit for their use. The difficulty of deciding how much detail is appropriate for quality assessment is illustrated in Box 10.

Self-assessment of quality?

Another concern is that if the quality information is not presented at a sufficiently fine level of detail the resulting generalisations and summaries may hide, either intentionally or inadvertently, important deficiencies in the statistics or the SEA's methodologies. Concern has been expressed already that some self assessments using the IMF's present frameworks are unlikely to expose weaknesses in some country's system of economic accounts. This aspect involving sufficient detail about quality features is a major concern for developing credible DQAF/QMSEA type systems for practical use.

In the Foreword to the ABS Corporate Plan 2000 it is stated that:

“This Corporate Plan reaffirms the ABS Mission that we serve the whole community and that a good statistical system is important pillar of a robust democracy.”

Judgements about how good a statistical system is requires evidence concerning the quality of its major systems of economic accounts, as well as its other statistical products and services. Evidently, to be useful the quality information about SEAs needs to be credible. The question therefore arises as to whether it is appropriate to require any NSO to conduct its own quality assessment when it has a vested interest in the outcome? The ABS Corporate Plan 2000 states:

“We are also open about the quality of statistics, so that users can better understand and interpret them.”

But how open is open? Would there be concern, for instance, from quarters either within or outside the ABS that publication of information about low response rates for some ABS surveys might encourage future respondents not to respond, and/or put the ABS under pressure to explain why its Notice Of Direction policy is not effective?

There is therefore the issue of whether a QMSEA quality audit of SEAs be regarded as a type of open “performance” audit, involving a consortium of key user agencies such as the Treasury, Reserve Bank of Australia, and Prime Minister and Cabinet. Such a consortium could provide a useful role for key users to assist ABS in applying/assessing the QMSEA quality information, thereby providing directly a user perspective on those aspects of quality that are important to them in the use of SEAs.

4. CONCLUSION

Regarding other data quality assessment procedures being developed in ABS and overseas QMSEA differs in some important respects. Some examples of differences are –

1. QMSEA is designed to investigate whether present and future systems of economic accounts (SEAs) are likely to be “fit for purpose”.
2. QMSEA looks beyond probability based sample survey data to the full range of input data used to compile SEAs.
3. QMSEA will concord with the IMF Data Quality Assessment Framework, an international standard being developed, but aims to be more comprehensive than DQAF – in both the breadth and depth of quality auditing.
4. QMSEA is designed primarily for a relatively small, sophisticated group of users (both outside and inside the ABS).
5. Assessments against the QMSEA standards may in the long run use a combination of ABS self-assessment and external assessment (by, say, a consortium of user agencies such as the Treasury, Reserve Bank of Australia, and Prime Minister and Cabinet).
6. QMSEA’s quality measures may be made available in electronic form, so they can be readily maintained and interrogated.

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ABBREVIATIONS

ABS	Australian Bureau of Statistics
APRA	Australian Prudential Regulation Authority
ASNA	Australian System of National Accounts
BAS	Business Activity Statement
BPM5	Balance of Payments Manual, 5th edition
BOP	Balance of Payments
CPI	Consumer Price Index
DQAF	Data Quality Assessment Framework
EFTPOS	Electronic Funds Transfer at Point of Sale
GDDS	General Data Dissemination Standard
GDP	Gross Domestic Product
GFS	Government Finance Statistics
IMF	International Monetary Fund
MFP	Multifactor Productivity
NDP	Net Domestic Product
NGO	Non-Government Organisation
NPI	Non-Profit Institution
NSO	National Statistical Office
OECD	Organisation for Economic Co-operation and Development
OMB	Office of Management and Budget, USA
PPI	Producer Price Index
QMSEA	Quality Measures for Systems of Economic Accounts
RoA	Rest of Australia
RoW	Rest of the World
SDDS	Special Data Dissemination Standard
SDSD	Sampling Distribution Standard Deviation
SEA	System of Economic Accounts
SEEA	System of Economic and Environmental Accounts manual
UN	United Nations
USA	United States of America
WB	World Bank

GLOSSARY – TWELVE FACETS OF QUALITY

The following terms used to describe facets of quality in Quality Measures for Systems of Economic Accounts (QMSEA) are not necessarily independent or mutually exclusive of each other in their meaning.

Each explanation of a term in this Glossary provides generally a brief statement of the term's intent within the context of QMSEA. A definition or description of what the term means covers conceptually then follows. Where appropriate an indication of what is not meant by the term is given, and these instances should be noted. Examples from various Systems of Economic Accounts (SEA) are cited to draw distinctions or to illustrate interdependency with other QMSEA terms where appropriate.

Accessibility

Accessibility here relates to data and information dissemination matters. It considers the degree to which the SEA input/output data and related information are available to users. Aspects covered by the term accessibility involve data availability, metadata availability and the degree of interpretative assistance available to users of the particular SEA provided by the NSO.

Data availability involves issues of data presentation and cataloguing, distribution medium, as well as the availability of non-confidential but unpublished data used in the SEA. Metadata availability is related to issues surrounding the availability of information concerning the concepts, sources and methods associated with the SEA, including the availability of a comprehensive set of quality indicators for the SEA.

Accessibility also considers whether the information surrounding or supporting the SEA is openly available to the public, or whether some aspects of the SEA data and/or methods are not made public for reasons other than respondent confidentiality, for instance, because they are perhaps considered embarrassing or sensitive areas. For example, is some information concerning non-response rates in sample surveys suppressed in order to prop up confidence in the survey results and/or avoid awkward questions regarding the application of serving Notices of Directions to recalcitrant respondents? Or are details of specific influential items in the Consumer Price Index basket of goods suppressed in order to avoid manipulation of outcomes by some respondent retailers?

Accessibility is also related to lucidity. Lucidity considers how understandable the metadata information is likely to be to users once access to it has been gained, whereas accessibility considers the ease with which that information may be obtained from the distributional mediums or vehicles, regardless of whether it is comprehensible.

Accuracy

Accuracy here is concerned with the proximity of an estimate to the ideal or true, but unknown value of that component. It is concerned with the degree of precision associated with the estimate.

It is important to note that the true value is never known and that in practice there cannot be an overall measure of accuracy or total error. Consequently, accuracy is evaluated by considering the potential sources of error and considering whether they have been minimised optimally.

Accuracy is distinguishable from the terms reliability and revisability in the following way. The term reliability in the QMSEA context refers to the degree that an estimate or SEA information rates against all of the facets of quality, not just the single facet of, say, accuracy. That is, an estimate is said to be more reliable than another if it rates more highly against all of the QMSEA criteria than the alternative estimate. In comparison, revisability refers to the characteristics that the initial and subsequent intermediate estimates exhibit as they evolve towards the final or stable estimate of a component for a particular time period. It is possible for an estimate to be inaccurate but subject to no revision.

The degree of accuracy of an estimate, at a point in time and over time, is determined by a number of influences. Errors affecting the degree of accuracy can be classified as follows: survey sampling errors; frame errors; measurement errors; processing errors; non-response errors; model assumption errors, etcetera. The following list is not ranked in order of importance, nor is it necessarily complete.

Input data collection errors

These may involve the information providers or respondents being unable to report on the required basis, unintentional or intentional mistakes in reporting or late reporting, and errors occurring in the recording and processing of the input data reported. In SEAs there may be up to six input data streams so impacted: complete enumerations, administration or transaction by product collections, probability sampling, non-probability sampling, market/media intelligence and a synthesis of some or all of the previous streams. These streams are sourced from either the Australian Bureau of Statistics (ABS), the rest of Australia (RoA), or the rest of the World (RoW). Some of these streams and sources are more credible or accurate sources than others, in that they have established proven track records over time, and some are more problematic in that they are traditionally more difficult to measure.

Inaccuracies in the time of recording and the valuation of stock and flow items

Considered here is whether the time of recording “transactions” is in accordance with the principles of accrual or full accrual accounting, etcetera. Whether the valuation rules are appropriate and consistent in application across the SEA. For instance, market price rather than transfer price is used as the basis of valuation of market transactions in systems of economic accounts. A consideration is the extent to which output prices are recorded as either basic prices or producers’ prices. Basic prices are exclusive of transport and trade margins, of taxes on products like value added taxes, and of subsidies on products. Producers’ prices differ from basic prices in that they do include subsidies and taxes on products.

To be consistent with the valuation of domestic production, imported and exported goods should be valued at the border on a “free on board” (fob) basis. However, imports may be valued at the border of the importing country, rather than the exporting country, at a cost, insurance, freight basis for the purpose of compiling the supply and use tables at the disaggregated level of individual products.

Whether income and service transactions are recorded gross of any withholding taxes deducted at source, and securities transactions are recorded gross of any applicable fees and commissions.

Whether foreign currency transactions are converted into the domestic currency accurately. Transactions in foreign currency should be converted using the midpoint exchange rate prevailing in the market at the transaction date. If not the next best solution is to use the average exchange rate for the shortest possible period when that actual exchange rate is not available.

Where transaction estimates are derived from stock data, to what extent is an attempt made to revalue the stock data into their original currencies and then convert the change in original currency to domestic currency at the average exchange rate of the applicable period?

In non-market transaction the cost approach may have been adopted. Where barter transactions are a consideration how accurate/applicable have observable “prices” been in similar/comparable situations. If no prices are observable valuation at current cost may be deemed the next best solution, followed by historic costs and, if nothing else is available, the discounted present value of expected future returns.

Methodological errors associated with the input data collection vehicle or compilation procedure

For example, if the input data are derived from scientific probability sampling techniques, such as stratified sample surveys, the sample point estimates will have associated with them a Sampling Distribution Standard Deviation (SDSD), frequently referred to as the “sampling error”. Note that this “sampling error” doesn’t attempt to measure all errors associated with such sample results, even though the term “sampling error” might imply that it does cover all sampling errors. In the QMSEA framework the term “sampling error” will be infrequently used, so as to avoid confusion with the phrase “errors associated with sampling”.

The SDSD can be used to construct various confidence regions about some sample point estimates, under various conditions or assumptions. The smaller a SDSD is for a sample point result the more accurate it is thought to be, all other factors held constant. It should be noted that not all sample results have associated with them SDSD values. An example of surveys which don't produce SDSD values are the non-probability or purposive surveys used for producing the Consumer Price Indexes and Producer Price Indexes (Price indexes for materials used in, and articles produced by manufacturing industries, export and import price indexes).

For the ASNA no SDSD have been developed generally for the aggregate output data or key balancing items, like Gross Domestic Product or Private Final Consumption Expenditure. SDSDs for these “headline” indicators are unlikely to be developed because of the nature of the compiling procedures used in the SEA to transform the input data streams into the SEA output data, in a supply and use balanced integrated manner.

Other methodological errors arise in the areas of chain volume estimation, price index construction, seasonal adjustment and trend estimation. In these and other similar methodological areas the degree of accuracy may be investigated by considering axiomatic and non-axiomatic criteria, both in the theoretical and practical domain via simulations. Such results are often only indicative and should not be taken as definitive quality indicators.

Compliance

Compliance here refers to the degree or extent to which in practice the principles or objectives of the particular SEA, or methodology in question, are upheld or met. It should be noted that with regard to compliance a National Statistical Office could rate well against a particular SEA, say the System of National Accounts 1968, however, in the year 2001 this NSO’s SNA 1968 based SEA would rate poorly against the quality facet of relevance.

Similarly, a particular type of methodology may be employed by a NSO consistently and with lapidary precision and conscientiousness, indicating a high compliance rating. However, the methodology may be known to produce less than accurate results, or be inferior conceptually to another methodology, or also be subject to a high degree of revision. The ABS use of “constant price” estimation prior to the adoption of the superior chain linked volume method, is an example. On the other hand, a NSO may claim to have adopted a particular SEA in principle, say SNA 1993 or ESA 1995, but in practice have not substantially implemented the preferred system for various technical and non-technical reasons, and therefore rate less favourably against both quality aspects of compliance, consistency and relevance.

The aspect of compliance may impact on quality aspects of accuracy, relevance and consistency.

Consistency

Consistency here is concerned with the conceptual integrity of the SEA or its transforming methodologies. That is, for a SEA to what extent is its framework, definitions, classifications and conceptual boundaries logically sound, unambiguous and complete internally. It should be noted that theoretically a particular SEA may achieve a high degree of consistency but be judged to be not so relevant to contemporary requirements of analysis or decision making. For instance, note the supplementation of the core accounts of the ASNA with ad hoc satellite accounts and social accounting matrices. Consistency also considers the degree to which a SEA is conceptually consistent or integrable with other comparable SEAs, either domestically or internationally, e.g. SNA 1993, BPM5, GFS 1986, etcetera.

Consistency is also a quality aspect of a SEA’s transforming methodologies. For instance, the commonly employed X-11 based seasonal adjustment methodology is not consistent between monthly and quarterly flow data. Nor is it consistent in some other esoteric areas such as time reversal, or time labelling of the analysis span (ignoring trading day factors). Chain indexed volume measures are not universally consistent for “aggregation” purposes. For example, unlike constant price estimates, they are not strictly additive, in that the sum of the chain volume estimates for the components of some principal aggregate, such as GDP or total consumption, may differ from the chain volume measure of the total. Also, various types of price index methodologies are not consistent with respect to the full gamut of axiomatic criteria. Some of the inconsistencies are trivial, and some may not be for various forms of analysis.

The quality facets of consistency and continuity are similar aspects in the QMSEA context. Consistency has a point-in-time dimension in the QMSEA context, whereas continuity has an across time dimension.

Continuity

Continuity here has a temporal dimension, and is concerned with the extent that the conceptual consistency of the SEA framework, or the time series structural nature of the input data, or methodological impact on data output is sufficiently the same or continuous over time, so as to permit meaningful period to period comparisons, analysis and econometric modelling of socioeconomic relationships.

Continuity may be influenced by changes in the collection procedures of input data, changes to the concepts and definitions of the particular SEA, changes to the compiling/transforming methodologies, and/or changes to the time series characteristics of the data brought about by socioeconomic factors. Examples of the type of time series changes brought about by the above are, rapidly changing seasonal or trading day patterns, dislocations in trend levels or abrupt changes and reversals in rates of trend growth, or varying degrees of irregularity.

The quality facets of consistency and continuity are similar aspects in the QMSEA context. Continuity has an across time dimension, whereas consistency has a point-in-time dimension in the QMSEA context.

Frequency

Frequency here relates to the periodicity of the SEA's data reference period. It considers whether the reference periodicity is annual, quarterly or monthly, etcetera, and whether the particular periodicity is adequate to permit meaningful cyclical analysis by the key users. In this regard it is important to note that an economic cycle of duration shorter than twice the time interval between two contiguous data observations, or reference periods, cannot be properly recognised. Such a cycle will be statistically confused with a cycle of longer duration. Consequently, if the data reference period is annual, only cycles of duration longer than two years in length can be observed from this set of data, even though the data may be generated by cycles shorter than two years in length. Expressed another way, if cycles of length one quarter are to be monitored in practice the reference period has to be no longer than six weeks.

It should be noted that the periodicity of the data reference period is not necessarily the same as the periodicity of the so called "collection process". For instance, data whose reference period is a quarter may be collected yearly, or monthly data may be collected quarterly.

The quality aspects of frequency, relevance and timeliness and accuracy can have bearing on each other.

Longevity

Longevity here refers to whether the SEA data contains sufficient time series observations to undertake meaningful analysis of a historic nature, or whether it is sufficiently long to permit a particular statistical methodology to be appropriately applied to the data, such as seasonal adjustment or econometric modelling. For seasonal adjustment five years' worth of observations are usually needed to produce estimates of basic useability. More observations may be required if trading day variation is an influence in the data and needs to be estimated.

It's possible for a SEA to have short time series that are continuous, whereas another SEA may have long time series that may not be very continuous.

The quality facets of longevity, continuity, relevance, accuracy and revisions are often related. For instance, to maintain relevance, continuity may be given a lower priority, leading to shorter time series each having by definition reduced longevity, and in practice lower accuracy and increased revisability of the seasonally adjusted data.

Lucidity

Lucidity here is the facet of quality which relates how well users are serviced by the information about the SEA, and assisted with data interpretation and analysis, so that the SEA output may be understood and used effectively and appropriately. Lucidity here considers the informational content of "concepts, sources and methods" documentation, and the usefulness of "main features" commentaries and "explanatory notes" provided by the NSO. Lucidity is concerned with the "educational" value of this information.

For instance, in seeking to assess the difference in quality aspects of GDP *viz* NDP there is a qualitative difference between being told:

"GDP less the consumption of fixed capital is called net domestic product." (ABS, 2000, ABS cat. no. 5216.0, p. 30)

compared to being told:

“To ensure that GDP is a measure of economic production that is free of duplication, national accountants draw a distinction between intermediate and final purchases. All goods and services which are used up in the course of production by resident producers are intermediate purchases (and are referred to as intermediate consumption). Purchases of capital goods and finished goods and work in progress going into inventories are the only purchases of goods by resident producers that are regarded as parts of final demand. The ‘gross’ in GDP indicates that no deduction is made for consumption of fixed capital; in other words, the gradual using-up of the economy’s productive assets is not accounted for in GDP. A product figure net of capital consumed (i.e. net domestic product) would recognise capital consumption as a necessary cost of producing the economy’s goods and services and would therefore be a purer measure of production. However, because of the difficulties involved in measuring capital consumption (and more particularly variations in methods used between countries), GDP has remained the major summary measure of economic activity.”
(ABS, 2000, ABS cat. no. 5204.0, p. 90)

This facet of quality is related to, but different from the quality facet of accessibility. Lucidity considers how understandable the metadata information is likely to be to users once access to it has been gained, whereas accessibility considers the ease with which that information may be obtained from the distributional mediums or vehicles, regardless of its degree comprehensibility.

Relevance

Relevance here refers to the ability of the SEA information, and “intelligence”, to satisfy contemporary and likely future needs of Australia, both nationally and internationally. These needs are concerned with measuring and describing the socioeconomic concepts and aspects with which key users are most interested. Relevance is here concerned with how well the SEA is providing information concerning the most important features and developments about the various socioeconomic phenomena it is intended to address for decision making.

The facet of relevance is related to timeliness in that if the SEA information or intelligence is not available soon enough after the reference period for a particular use it is likely to be regarded as less relevant for analytical purposes. Refer to timeliness for a further discussion of this aspect of quality. Similarly, the facet of relevance is also related to the facet of frequency. If the frequency of a SEAs reference period is too low, important economic cycles may be misinterpreted or reacted to too slowly, and the data may not be considered very relevant for some types of analysis.

The term relevance also considers temporal aspects, such as whether the annual data from the SEA is calendar or fiscal year based. If the data are fiscal year based, the issue is whether the fiscal year is of a type that is relevant for international comparisons, as not all countries have matching fiscal years.

Similarly, stock measures such as assets, liabilities, employment or unemployment, and prices, have a temporal features that are important for relevance considerations. These stock indicators should in principle be measured at a point in time rather than over an interval of time. In practice some of these stock indicators are not collected at a point in time. Some are collected over a time interval, with the measurement or reference interval drifting over time, rather than being fixed at the start of the reference period. For instance, employment and unemployment numbers in Australia do not relate to a specific time point each month, but are collected over the period of a fortnight and relate to the fortnight before collection. The interval between collection periods is approximately monthly, but has been as short as three weeks and as long as six weeks. This drifting reference interval of the labour force stock indicators may add a degree of artificial variability to the raw data. Also, some stock indicators are constructed from data collected at time points spread throughout reference period. For example, the Consumer Price Index is not a composite index of prices all measured at the same point in time: its constituent price components are collected throughout the quarter. These features of the data can have important ramifications for whether these SEA data are relevant for various forms of analysis.

The above aspects of relevance are distinguished from accuracy in the QMSEA context in the following way. The above stock data may have been collected and compiled in strict accordance with a set of design specifications, and so may be referred to as accurate with respect to the design specifications. However, it may be that the design specifications have led to the production of data that is less relevant for some analytical purposes.

The term relevance also considers whether there are questions of statutory relevance. For instance, the Australian Statistician has suggested in June 2000 that various price index methodology should be enshrined into legislation only once the pros and cons of the indexes are understood by the users.

“It was suggested that users be educated about the advantages and disadvantages of using different indexes for contract escalation purposes. When a price index is to be used by the government as a price escalator, Mr McLennan said that it is important that the ABS strongly encourage Ministers to ensure the correct index is enshrined in legislation.” (*Prices, Productivity and Public Finance*, DHM/2000/9, para. 13)

Revisability

Revisability here does not mean the procedural degree of ease with which the SEA, its attendant methodologies/procedures, or its input/output data may be revised. The term revisability here refers to the revision characteristics which an estimate of a socioeconomic variable displays over time as subsequent estimates for the same reference period is made. It also considers the inherent revisability characteristics of the compilation/transformation methodologies employed with a SEA. For instance, the unavoidable revisions encountered with some chained link volume measures, seasonally adjusted series, and trend estimates.

In the QMSEA context revisability is used in a similar sense to OMB's Directive No. 3, in that for a particular estimate it considers the magnitude and direction of revisions, and these attributes of input and output data are relatively easy to measure compared to aspects of accuracy.

The magnitude and characteristics of revisions to SEA output data have been suggested by some analysts as one of the most useful indicators of quality. While intuitively it make sense to regard data that is subject to large and generally one-sided revisions as being less useful than data subject to fewer revisions, the absence of any obviously large errors in a balancing item, such as GDP, may mean that there have been large compensating errors made on both sides of the accounts.

Also, recent studies are finding that some users of the data appear indifferent to data revisions. For instance, Brooks *et al.* (1999) found that while nine Australian financial markets do respond to new data, they do not respond to data revisions in the first instance.

“A plausible reason for this result is that official announcements simply confirm or deny market expectations that are already discounted into prices. Given that markets are forward looking, revisions of ancient history are less relevant than current data. The news component of the announcement ‘crowds out’ the revision. Alternatively, the often massive revisions that are made may partially discredit the extent of the revision and markets may simply disregard them.”
(Brooks and Davidson, 2000)

Revisability in the QMSEA context also considers the effect of various arbitrary revision policies that may be adopted for operational convenience by the NSO.

In the QMSEA context the terms accuracy, revisability and reliability relate to different aspects of quality.

Sense

Sense here considers the degree to which the SEA input/output data “makes sense” or accords or behaves coherently with other partial, leading, concurrent or lagging indicators or signals from other datasets. It is a measure of quality that also encompasses data input and output credibility checks. Such checks may, for instance, involve judging whether the seasonal patterns displayed by new accrual based Government final consumption data accord with expectations that the patterns be weaker than that displayed by the cash based data.

The supply and use balancing approach in the annual ASNA is aimed at ensuring that the system of national economic accounts makes better sense. The supply and use approach to the compilation of the ASNA forces “reconciliation” of the production, expenditure, and income accounts. These types of accounts are traditionally compiled using independent sources and methods and can produce markedly different results. Generally the more disaggregated the level at which the “supply and use” method is applied, the more accurate the results tend to be. Such integration of the various datasets of the accounts should tend over time to improve the reliability (in the broad QMSEA sense) of all the datasets involved by exposing and eliminating inconsistencies which are indicative of errors somewhere in one or more of them. With regard to the quarterly ASNA the situation appears different to some degree.

“In the national accounts user review the ABS received praise for improving the coherence between quarterly national accounts and associated partial indicators that are published ahead of it. The ABS was also urged to reduce, and preferably eliminate the statistical discrepancies for quarters and the last year. Ironically, quarterly supply and use tables would achieve a reduction, or elimination of statistical discrepancies at the expense of coherence with partial indicators.”
(Aspden, C., BR/2001/7(Apr))

From the above it should be noted that while the extent to which a set of statistics appear sensible or are coherent, may be reassuring in that it is suggestive of greater accuracy, this attribute is only a guide.

“ ... , 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.” (ABS, 2000, ABS cat. no. 5216.0, p. 400)

Sense, consistency, continuity, and accuracy are related aspects of quality.

Timeliness

Timeliness here is intended to measure the extent to which the time value of the SEA information is preserved. It recognises that the value of the SEA data for decision making tends to decrease as the time from the reference period increases. Also, given that headline SEA data tends to have significant commercial value and can affect foreign exchange, financial and commodity markets markedly, prompt release of SEA data may reduce the chance of unauthorised premature disclosure of the data and the adverse consequences associated with such events.

Timeliness here is similar to the term used in the USA Office of Management and Budget's Statistical Directive Number 3, *Compilation and Release of Principal Federal Economic Indicators*. (OMB, 1985)

This facet may relate to other facets such accuracy, revisability, sense and relevance, access, and lucidity. An improvement in one these facets may improve or attenuate one or more of the other facets.

Some specific aspects, criteria or standards of timeliness are as follows.

- a. The time interval between the reference period of the data/estimates and the public release date of the information should be as short as practicable, all other things being equal. As a standard, data issued quarterly or monthly should be released within XX working days of the reference period. See b.
- b. A data release schedule should be published for XX months ahead, and indicate a regular cycle for release of particular sets of SEA data. In addition, individual publications (hardcopy or electronic) should include notification about the next release date and time. Changes to this schedule should only occur if unforeseen and extraordinary circumstances arise and such changes must be broadcast in advance of the scheduled release date and fully explained.
- c. To what degree are release dates of relevant SEAs in synchrony, and vice versa, with the analysis schedules of key users, such as Treasury and Reserve Bank's fiscal and monetary policy formulation cycles, and for keeping the general public informed, and attuned to the dissemination realities of the media.
- d. Where interpretation of the SEA data may be affected by planned changes either to source data, the conceptual framework of the SEA, or the methods of estimation or compilation, such changes should be announced as far in advance as possible, but at least XX months in advance.

APPENDIXES

A. QMSEA ENVIRONMENT – SCHEMATIC OUTLINE OF THE FEATURES OF SYSTEMS OF ECONOMIC ACCOUNTS

Appendix A is available from the author on request.

B. INTERNATIONAL MONETARY FUND – DATA QUALITY ASSESSMENT FRAMEWORK – “LITE” SUMMARY

Appendix B is available from the author on request.

Revised (1993) version: http://dsbb.imf.org/vgn/images/pdfs/dqrs_factsheet.pdf

C. INTERNATIONAL MONETARY FUND – SYSTEM OF NATIONAL ACCOUNTS – QUALITY ASSESSMENT FRAMEWORK.

Appendix C is available from the author on request.

Revised (1993) version: http://dsbb.imf.org/vgn/images/pdfs/dqrs_nag.pdf

D. QMSEA AND INTERNATIONAL STANDARDS

A feature of the IMF quality project DQAF is that there is a relatively close mapping to some existing international statistical standards, concepts and manuals. For example, the 1993 System of National Accounts and the fifth edition of the IMF's Balance of Payments Manual are used as benchmarks for definitions, concepts, classifications and valuation methodologies. ABS generally complies with these standards and so the IMF quality framework provides a basis or foundation on which to build more comprehensive quality assessment system for the ABS's economic accounts.

However, there are some concerns associated with attempting to base a quality assessment system solely around existing international standards. International standards are not necessarily monolithic, homogeneous, consistent, generally complied with, integratable, or best current practice, as discussed briefly below.

Internationally accepted statistical standards can be useful, but they are not always the currently best available practice. For instance, consider SNA 1993, which is the present standard adopted by the ABS for its national accounts. This version of SNA, however, followed SNA 1968, and was implemented by the ABS in December 1998 for the September quarter 1998 national accounts. It was changes in the structure and nature of the economy, the increasing sophistication and growth of financial markets and their instruments, emphasis on the interaction of the economy with the environment and other considerations, such as a need to clarify and simplify the prevailing accounting system, that indicated a need to update the SNA from the 1968 version.

The task of modernising SNA commenced in the mid 1980s and the new version was released under the auspices of the Commission of the European Communities (now Eurostat), the International Monetary Fund, the Organisation for Co-operation and Development, the United Nations and the World Bank in 1993. Until the implementation by ABS of SNA 1993 in 1998, the system used through the 1990s was based on the conventions and practices prior to 1968 and evidently not up to date.

Recently there has been much talk about the so-called "new economy".

"The term New Economy refers to a set of qualitative and quantitative changes that, in the last 15 years, have transformed the structure, functioning and rules of the economy. The New Economy is a knowledge and idea based economy where the keys to job creation and higher standards of living are innovative ideas and technology embedded in services and manufactured products. It is an economy where risk are uncertainty, and constant change are the rule rather than the exception." (Edwards, 2001, para. 22)

This raises the question of whether SNA 1993 is relevant or sufficient to the task of monitoring the new economy now or about 2010.

In the mid 1990s the OECD was told:

“More seriously, I believe that by most criteria US economic indicators meet or exceed reasonable criteria for timeliness and also meet those criteria for reliably measuring short-term economic change. This, however, is quite different from saying that our statistics are keeping pace with longer run forces shaping the US, indeed the world, economy. Our economies are changing faster than our ability to measure them. Economic output is increasingly conceptual rather than physical. The form of output and the means of production have been increasingly less physical and tangible, hence more difficult to measure. ... This trend is sure to continue into the 21st century.” (Waite, 1995, p. 10)

In Australia, as elsewhere, commodities and industries grow at different rates, and new products come onto the market and old ones leave on a regular basis. It is therefore important that our SEAs are flexible enough to keep pace with the change.

Unlike DQAF, one aim of QMSEA will be to explicitly assess and review whether the SEA methodologies and basis are relevant and appropriate for the present and foreseeable future circumstances of Australia. QMSEA will not automatically assume an international standard is necessarily the best or appropriate benchmark for the above reasons and those reasons discussed below.

Some international “standards” are not monolithic or homogeneous in their application, or universally adopted by NSOs. SNA 1993 is an example. It was designed to be flexible in its operation so that economies in various stages of development or in particular economic/financial circumstances could be accommodated under a broad accounting umbrella. However, SNA 1993 is still not a system adopted by all countries. This aspect of SNA 1993 is illustrated by the fact that all the countries of the European Union don’t use SNA 1993 but rather use the system known as the European System of Accounts 1995 (ESA 1995). This system is almost consistent with SNA 1993, and so is similar to, but different from the SNA 1993, the differences catering for specific European requirements. (McCarthy, 1999) It needs to be recognised that in some circumstances parts of an international standard, like SNA 1993, may not be suitable for Australian systems of economic accounts or conditions.

Some of the international “standards” are not consistent or integrated with each other. This is ironic, as one of the main reasons for setting international standards such as SNA 1993 or ESA 1995 is to maximise international comparability of these important statistics. Several international accounting frameworks are used by NSOs in addition to SNA 1993 or ESA 1995. Two examples are the Balance of Payments Manual, 5th edition, 1993 (BPM5) and the Government Finance Statistics manual 1986 (GFS 1986). The GFS 1986 is not consistent with the conceptual framework of either the SNA 1968 or SNA 1993 or ESA 1995. The inconsistencies arise mainly because SNA/ESA data are compiled as closely as possible on an accruals basis while the GFS 1986 largely records transactions on a cash basis. Although there have been moves underway to update

GFS 1986 to ensure greater consistency with SNA 1993 and ESA 1995 in valuation and other conceptual areas, it will not be possible to eliminate all differences.

Another complication for effective integration and consistency between the SEAs is that although, for example, the GFS may be changed to an accruals basis theoretically, the availability of source data primarily on a cash basis still gives rise to inconsistencies between the systems in practice. This can occur for contemporary periods as well as historic periods. For instance, although the Commonwealth Government of Australia shifted to an accrual accounting basis on 1 July 1999, there were subsequent delays in receipt of accrual data by the ABS that have led to subsequent delays in the release of the quarterly national accounts for four quarters.

“ ... , the move to accrual accounting has not been without its problems. There have been many issues associated with the provision of accrual data from the various jurisdictions that have required resolution and, in some cases, the data available for national accounts compilation has been far from ideal. For two State Treasuries – Queensland and Western Australia – data simply have not been provided and they have had to be estimated by the ABS using budgetary information. Also, as it has generally not been possible to re-estimate historical series on an accrual basis, there have been issues associated with seasonal adjustment due to apparent changes in seasonality that cannot properly be quantified.” (Harper, P., BR/2000/5 (Apr), para. 16)

Here there is a practical example of the tradeoffs and interactions between the various facets of quality: accuracy, relevance, consistency, revisability, longevity and timeliness.

The unavailability of source data can also lead to parts of a particular system of economic accounts being inconsistent, besides leading to various SEAs being partly inconsistent with each other. For practical reasons complete implementation of accrual accounting has not been possible in some other areas of the ASNA. Some examples of where accrual accounting has not been adopted include household income tax and various employee entitlements including recreation and long service leave.

While many countries of the world have expressed their intentions to produce their statistics in an SNA1993 framework and format, this by no means guarantees that their data conform to the SNA 1993 standards.

“Without some assessment of the quality of the data, which is usually difficult in practice, the mere presentation of the data in the right format may be no more than 'window dressing' to satisfy the demands of the agencies concerned.” (Hill, 1999, p.1)

Implementation by NSOs of international standards like the SNA 1993 tends to be selective and judgmental for the following pragmatic reasons.

Some parts of the SNA 1993 do not have the general support of economists and national accountants. Some illustrations involve attempts at early updates to the SNA 1993 which were later reversed. For example, the expert group's decision to capitalise

Research and Development expenditures was subsequently reversed because of objections by many NSOs. Another example is of some NSOs now thinking the SNA 1993 has not gone far enough in the area of regarding all defence durables which can equally well be used for civilian purposes be treated as assets rather than consumables.

Some international standards are not always consistent internally. In the SNA 1993 the treatment of intangibles and royalties is an example. (Hill, 1999, p. 2) Another is the conceptually flawed SNA 1993 definition of global output regarding financial institutions services indirectly measured (FISIM) and definition of the financial sector.

“The expert group on the revision of the SNA abandoned the attempt to find general definitions for ‘money’ and ‘banks’ which would be both meaningful and useful across a broad spectrum of countries.” (Hill, 1999, p. 6)

This is an area of concern because financial institutions and financial instruments are continually evolving into new forms, and play a greater role in the new economy. (Hill, 1999, p. 7) Also, the treatment of the interest on bonds in SNA 1993 and BPM 5 is not always satisfactory. By recording the gains but not the consequential interest changes the system of accounts become internally inconsistent. (Hill, 1999, p. 8)

Some areas of the SNA 1993 are ambiguous, so that judgement by NSOs has to be exercised. The allocation or non-allocation of the output of financial institutions services indirectly measured (FISIM) was not resolved in SNA 1993. Depending on the economic significance of the financial sector to economic activity the allocation or otherwise of output from FISIM can have a noticeable impact on GDP growth. In this area the ABS has taken a leadership role:

“The method of implementing FISIM developed by ABS is likely to form the basis for an updated international standard in this area.” (Hill, 1999, p. 7)

In some areas the SNA is clear, direct and unambiguous about what should be done, but is not explicit about how it should be achieved. This raises particular dilemmas for NSOs and for quality assessments of SEAs. For example, the treatment of illegal and underground economic activities, the so called black economy. SNA 1993 requires most illegal activities and transactions to be recorded in the accounts. This is because logically the legal and illegal economies are interdependent and interact with each other, and consequently constitute a single economic system. To exclude the black economy from the accounts would introduce errors into the key aggregates of the accounts, and render the system internally inconsistent and misleading for analysis. However, the practical difficulty of obtaining any reliable data regarding illegal activities and transactions is self evident. But because of the nature of these particular activities SNA 1993 cannot provide guidance to countries as to how in practice the economic value of these activities can be best estimated.

In the ABS nine methods have been considered for estimation of the black economy, but which method is appropriate is conjectural. This area raises particular problems for quality assessments. Internationally this area tends to be neglected because of the sensitivities involved and practical methodological difficulties, and the quality of the systems of economic accounts suffer accordingly.

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