**The Challenges of Introducing New Standards and Classifications into the Australian Input Output Tables**

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### Abstract

The implementation of new standards and classifications by any statistical organisation raises significant challenges. The release of the 2006-07 Australian Input Output (IO) tables in December 2010 were the first to be published by the Australian Bureau of Statistics (ABS) that incorporated changes to the System of National Accounts 2008 (SNA08), Balance of Payments Manual 6 (BPM6) and the Australia New Zealand Standard Industrial Classification 2006 (ANZSIC06) into the IO tables. ANZSIC is the industry classification used by Australia and New Zealand and aligns with the International Standard Industrial Classification (ISIC).

The implementation of SNA08, BPM6 and ANZSIC06 has had significant impacts on the economic statistics produced by the ABS and particularly the production of the National Accounts data, including Supply Use (SU) and IO tables. The ABS chose to implement all three changes in a 'Big Bang' strategy rather than through a multi-staged approach in order to reduce the impact on users of multiple breaks in time series. This paper discusses the challenges faced by the ABS in implementing the new standards into the National Accounts and SU/IO tables and outlines the strategies adopted by the ABS with respect to data collection, statistical methodology and IO table compilation. The paper will also discuss some of the issues experienced by users of IO tables when faced with the prospect of working with new standards. The main focus of the paper will be on SNA and ANZSIC changes as these had the greatest impact on the National Accounts and IO tables.

### Introduction

The planning for, and introduction of the SNA and industry classification changes into ABS Macroeconomic Statistics took almost 10 years (2001 to 2010) with the final piece of the Australian National Accounts puzzle, the publication of the 2006-07 IO tables, falling into place in December of 2010. While the changes to the SNA and ANZSIC are many and complex, they can be summarised as those that affected the level of Gross Domestic Product (GDP) (SNA changes) and those that impacted upon the composition of the National Accounts and IO/SU tables (both SNA and ANZSIC).

Many National Statistical Offices (NSO) are currently implementing or are planning to implement the SNA and ISIC revisions into their economic statistics and will face many of the same issues that were experienced by the ABS. The ABS decided that a 'Big Bang' approach to implementation was preferred to the alternative of phased implementation with instability in data series over a possibly protracted period. However, the decision created a significant management and coordination task to cover:

* the multiplicity of changes;
* an ambitious timetable;
* the alignment of SNA and BPM implementation with ANZSIC required SNA and BPM work to be undertaken before the standards were finalised and more importantly without the benefit of other nations' experiences. Best practice with regard to a number of standards is still emerging;
* the SNA, BPM and particularly the ANZSIC changes in some cases required system re-engineering, creating additional change management workloads; and
* interpretation and quality assurance of ABS output.

It should be acknowledged that the ‘Bing Bang’ approach of the implementation of the new standards left the ABS little room to manoeuvre during the Global Financial Crisis as significant resources were locked into SNA/ANZSIC implementation.

### ABS Statistical Strategy

Supply Use and Input Output tables are one part of the suite of macroeconomic statistics produced by the ABS. In planning for the introduction of SNA08 and ANZSIC06 the ABS developed a wide ranging implementation strategy which focussed on having all the changes fully implemented for the release of the 2008-09 annual National Accounts in December 2009. The planned statistical strategy involved:

* the ABS Business Register carrying two ANZSIC codes from Dec 2005 to June 2009;
* full survey redesigns to ANZSIC06 basis from July month and September quarter 2009 reference periods for sub-annuals; 2005-2006 reference year for annuals;
* publication of statistics only on an ANZSIC06 basis occurred following the redesign activity.
* annual collections to produce 3 years of 'extended overlapping bridging' data on the new basis;
* subannual collections had a similar strategy; and
* National Accounts backcasting 15,000 series to 1959-60.

The reason behind the long lead time for the National Accounts to be released under the revised standards was that the ABS decided that all indicator series and data sources should be on the new standards before the annual national accounts were produced on that basis.

Other elements of the strategy included:

* Regular annual economic collections to have parallel estimation;
* Irregular collections to be dual coded (e.g. Retail Industry & Wholesale Industry, Agriculture Census & Service Industries); and
* Non ABS Register sourced collections to be dual coded (e.g. Population Census & Labour Force Surveys).

It should be noted that at the time of the development of the ANZSIC Implementation Strategies the ABS had ceased producing IO tables and the need for the detailed commodity data was not seen to be as critical. This factor had a significant effect on the compilation of the first IO tables on the new standards.

 It was not until 2008 that the IO program was reinstated by the ABS, this was in response to the Australian Governments need for detailed IO data for input into the modelling the impacts of policy initiatives such as an Emissions Trading Scheme (ETS), and the need for detailed product level again become a priority.

### SNA Changes

The revised SNA changed the measurement of a number of components of the Australian System of National Accounts (ASNA). Listed below are some of the main changes from SNA08 adopted by the ABS that affected the national accounts and IO/SU tables as well as a key change from the SNA93 review which had not yet been implemented:

* Capitalisation of some types of expenditure on defence weapons platforms;
* Introduction of research and development as capital formation; and
* Inclusion of orchard growth in the capital and production accounts (SNA93).

The net effect of these changes increased the GDP of Australia in 2006-07 by approximately $50 billion or 5%. However, these changes also had a very visible impact on the presentation of SU/IO data. For example, the capitalisation of expenditure on defence weapons platforms resulted in a new column vector being added to both the SU and IO tables specifically for these assets. Note these vectors appear in the production environment for both the SU and IO tables but are not separately published.

The introduction of own account Research and Development (R&D) as capital formation increased the incidence of secondary production arising from own account R&D, with all industries now producing this product. As a result of this change in treatment, the coverage ratio for the industries producing R&D services has fallen. It should be noted that there are a number of products where the capitalisation of own account production by units results in an increase in secondary production and a subsequent decrease in the coverage ratios; own account construction and software development are two other examples of this phenomenon.

Detailed information about the full range of SNA, BPM and ANZSIC changes to ABS statistics is available in the Information paper released in October 2009 Implementation of new international statistical standards in ABS National and International Accounts, September 2009 (cat. no. 5310.0.55.002).

### ANZSIC Changes

The ABS uses ANZSIC as its industry classification in most of its economic collections and for the compilation of the national accounts. A wide range of other users from government, academia and the private sector use the ANZSIC for financial, administrative and statistical purposes. ANZSIC06 was a substantial departure from the previous version and resulted in both a significant reorganisation of industries and the creation of new industries (e.g. a whole range of 'new economy' activities have been recognised, including: Internet publishing and broadcasting and provision of Internet access services) with focus on the finer classification of services.

Table 1 provides a glimpse of the extent of the changes to the ANZSIC with significant increases in categories across all levels of the classification. In addition, a number of activities moved to different industry divisions, subdivisions or groups which resulted in 168 (or 36%) of the existing ANZSIC93 classes being split or modified in ANZSIC06. This created many partial correspondences between the two classifications and was by far the biggest impact upon ABS economic statistics since the introduction of ANZSIC93 approximately 15 years earlier.

**Table 1: ANZSIC93 and ANZSIC06 Structure**



### Changes to IO classifications

The ABS uses IO specific product and industry classifications in the compilation of its SU and IO tables. The IO Industry Groupings (IOIG) used by the ABS aligns to the ANZSIC at various levels of the classification, depending on the importance of various industries. While the IO Product Classification (IOPC) uses ANZSIC as its industry of origin classification. The introduction of ANZSIC06 led to an extensive review of both the IOPC and IOIG. The IOIG is the level of stratification used by the ABS in its business surveys, while the IOPC is the basic product building block for not only IO compilation but also the SU benchmarking process for the National Accounts.

The IOPC was reduced from 1418 to 1284 products, while the IOIG increased from 110 to 112 industries. However, the extent of the changes to the IO classifications is much greater with:

* 183 of the original 1418 IOPCs split into two or more new IOPCs; and
* 61 of the original 112 IOIGs split into two or more new IOIGs.

The sizeable reduction in products (relative to its ANZSIC 1993 counterpart) arises from the removal of the 'other income' and 'change in inventory' products for each IOIG rather than a reduction in detail. These products are now allocated to the products primary to the specific industry of origin. While the changes to ANZSIC were a catalyst in the review of the IO classifications, the ABS also took the opportunity to address weaknesses or omissions in the old classification. The changing nature of the Electricity industry in Australia has seen electricity being bought and onsold like many other products. However, previous versions of the IOPC did not include an Electricity Margin product which meant this output was being classified as a non-margin product. This change also impacted upon the allocation of margins in the tables.

Correspondence tables, both conceptual and practical (the weight/factors that show the distribution from old to new) between the old and new classifications were developed in order to assist in the transition process. The ABS has made the conceptual correspondences available to users. However, the weighted tables were for ABS internal use only.

### IO/SU Compilation Issues

#### Production data

The single largest difficulty to affect the compilation of the IO tables on the new standards was the availability of detailed commodity level data. While the basic ABS economy wide business collections were stratified at the IOIG level, there were no additional commodity collections undertaken by the ABS in the changeover reference year. Therefore, while SU/IO compilers had data on supply, use and other national accounting aggregates at the industry level there were data gaps in various industries for the production of commodities.

Some industries were well serviced for commodity production data, such as Agriculture and Mining, while others such as Manufacturing did not fare as well. These data gaps presented SU/IO compilers with the added challenge of using commodity detailed data collected on a different basis and pushing that data forward for use in the compilation process.

Correspondence tables produced between the various classifications were an important tool in the compilation process. For the products that had a partial correspondence to the new classification, weights were required to be generated to allow for the allocation of data from old to new. Essentially, these weights or factors were based on previous commodity collections and applied to 2006-07 industry output. However, the nature of the derivation of the weights caused a number of data coherence issues with commodity production estimates. This resulted in significant resources being applied on the analysis of the new commodity production estimates, especially for manufacturing industries.

Another strategy adopted by the ABS to fill data gaps was the introduction of targeted industry case studies. This involved selecting industries with a high degree of homogeneity and industry concentration for study. A purposive sample of businesses in these industries was selected for face to face interviewing in order to collect detailed commodity production and use information. This information was then used by compilers to refine commodity level production and use data.

#### Intermediate Use Matrix

The intermediate use (IU) or absorption matrix was a particular concern in the production of the 2006-07 IO tables. Up until this point the previous year's intermediate use matrix was able to be used as a starting point. The basic approach used by the ABS was to inflate the previous intermediate use matrix using a series of price indexes. Unfortunately, the extent of the changes to the IOPC and IOIG meant that IU matrix had to be rebuilt. The 2005-06 IU matrix was converted to the new classification based on correspondence tables, and then pushed forward using a series of price indexes (mostly output and not use indexes).

As mentioned previously, the correspondence tables built caused data coherence problems for output. These same issues not only surfaced for the IU matrix but were amplified as the correspondences were built for output/production data and not for intermediate use purposes. Therefore, the new IU matrix required an extensive review. Given the size of the matrix (1284 products by 112 industries) this was a challenging task for IO compilers. While some things never change, coal is still used to make coke, other production functions were not so easily converted.

Given the annual IO compilation cycle it was not possible to subject every industry/product to scrutiny. Instead resources were directed at an analysis of the largest products.

#### Margins, Taxes and Subsidies

The ABS IO system uses a set of rules which govern the allocation of the different Margins, Taxes and Subsidies (MTS) to each commodity. For the 2006-07 IO tables new rules governing the relationship between each industry, product and each margin, tax and subsidy had to be redefined. The process for the creation of the new rules was a labour intensive exercise. Initially, each 'new' product inherited the MTS characteristic of its parent (i.e. the corresponding product under the old classification) and then each product was scrutinised to ensure that it attracted the relevant MTS. In the case of the new margin product - Electricity Margin, new rules had to be defined. Additionally this new margin had to be incorporated in the IO processing and dissemination systems.

The allocation of margins at the detailed product level was not available according to the new classifications and was estimated using various methods ranging from data collection, correspondences between old and new classifications to ratio analysis. The ABS periodically undertakes margin ratio analysis (e.g. Retail Margin compared to Household Final Consumption Expenditure) particularly for trade margins. The Basic Price balancing process also highlighted a number of allocation issues and proved to be a powerful tool for improving margins allocations.

In most cases the ABS collected margin information at the broad industry level and used the methods described above to allocate margins to the detailed product level. However, the ABS did collect margin information on products from both the Wholesale and Retail industries in 2005-06. Although, the survey was designed on the ANZSIC93 standard, the ABS was able produce data on both an ANZSIC93 and ANZSIC06 basis as the survey frame for these collections was industry dual coded.

The ABS uses Government Finance Statistics as the source of Taxes and Subsidies data. This data is received in aggregate form and does not contain any product or industry dimensions at this stage. The ABS models the allocation of Taxes and Subsidies to products and production using the MTS rules and other information such as Household Final Consumption Expenditure data. The ABS undertakes regular reviews of the model and rules in order to improve the allocation of Taxes and Subsidies.

### Systems

The ABS uses an Excel based spreadsheet system to compile both its SU and IO tables which are partially driven by metadata. As a consequence of the classifications changes, all the relevant components of the systems had to be updated. This upgrade proved to be time consuming because of the number of components involved and the fact that the system was only partially metadata driven, meaning significant portions of the system had to be completely rebuilt and rewritten. While the current system is still an Excel based system the ABS has taken steps to redevelop the system in an Oracle database in order to remove this weakness. The inherent ability to efficiently update the relevant dimensions in a database environment instead of spreadsheets will reduce the burden associated with future classification changes. The ABS expects to fully implement the new system in 2012 for the compilation of the 2008-09 reference year.

The introduction of new components such as the Defence Weapons Platform in Gross Fixed Capital Formation and the new Electricity Margin required structural changes to the system. Other changes relating to the SNA 08 implementation had little impact on the compilation and dissemination systems.

### User communication

The fundamental changes to the metadata used in the presentation of the Australian IO tables caused concerns amongst users that have become familiar with the presentation of the data in a specified format (i.e. table numbers) but also the lost familiarity or knowledge of industries and products. To mitigate users concerns, the ABS consulted extensively during the ANZSIC development and Implementation processes as well as the development of the revised IO classifications. Significant effort was placed on developing communication strategies that not only identified the changes to users but also the impacts of those changes on data. For the IO program an IO User Group was convened, which included a range of key users of the data as well as experts in the field of IO theory and practice, in order to provide the ABS with advice and feedback on various issues on IO table compilation.

As the release of the 2006-07 IO tables was in December 2010 and the main users (such as the Australian Treasury) are in the process of analysing and incorporating the data into their models. To date much of the discussions between the ABS and users is centred on better understanding the changes to the IO data due to the change in standards.

### Future Work

While the production of the 2006-07 IO tables is only recently past, the need for review and constant quality improvement of the tables has not diminished. The ABS is currently undertaking a minor review of the IO classifications despite the fact that it only just completed the first set of tables under the new standards. It was the work on the 2006-07 compilation that has driven this review by exposing issues with both the revised IO product and industry classifications.

Research into refining margin allocations is an ongoing goal of the IO work, with much of the focus being directed at the Transport margins, with specific interest in the imbedded freight charges not separately invoiced by producers. In the Australian context this is especially important given the significant distances many of the basic commodities are moved from production sites to purchasers. In order to improve Transport margin allocations and estimation of embedded freight charges the ABS is undertaking a Transport Industry Survey in 2011 and including extra freight related questions for non-Transport industry businesses in the annual economy wide economic collection in 2010 and 2011.

The ABS has also made progress in transplanting the spreadsheet based compilation system to an Oracle database. This initiative will assist in the production of tables by improving the balancing processes, efficiency of compilation and incorporating internal quality checks. Another benefit of this initiative will be a reducing the length of time between the release date of the tables and their reference year. In addition, work will be undertaken in further refining the way the system applies the margin allocation rules.

The case studies program will be expanded to include more industries as the cost of direct collection of commodity detail data becomes a less attractive option due to increasing costs and modelled data becomes dated.

### Conclusion

Focussing purely on the compilation of IO tables the introduction of new standards highlights a number of lessons for future changes:

* detailed commodity data needs to be collected in the changeover year for both supply and use;
* where correspondences are relied upon sufficient time must be available for compilers to investigate data issues;
* systems should be flexible so that metadata changes do not result in major redevelopment work.