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**Price and volume measures**

# Measuring Prices and Volumes for Multinational Enterprises

## Prepared by Australian Bureau of Statistics[1]

*Summary*

A key requirement of producing accurate volume measures of production in an economy is the ability to remove any increase in expenditure that is purely due to increases in price. Increasing globalisation has made this task more difficult. This document discusses the ABS's current approach to measuring price and volumes from a globalisation perspective using three examples to highlight the issues faced in the national accounts as well as an increase in the service based economy, has made prices less clearly defined.

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[1] James Lister-Cummins and Paul Roberts

# I. Introduction

1.      A key requirement of producing accurate volume measures of production in an economy is the ability to remove any increase in expenditure that is purely due to increases in price. This requires accurate and robust price estimates. This document discusses the Australian Bureau of Statistics' (ABS) approach in dealing with large multinational companies when applying appropriate price deflators for estimating volume measures of production.

2.      The issues discussed here can apply to both annual and quarterly estimates for volume estimates of production in the national accounts. This document will focus primarily on quarterly estimates. The reason for this approach is the implications for the statistical discrepancy between the three measures of GDP that are produced by the ABS.

3.      The ABS produces GDP using three approaches that are then averaged to produce the headline measure, known as GDP(A). The three approaches are the production, expenditure and income measures of GDP. While each measure should conceptually deliver the same estimate of GDP, if the three measures are compiled independently using different data sources then different estimates of GDP result. Where estimates have been derived from balanced supply-use tables, annual estimates using the I, E and P approaches are identical. However, this is not the case for quarterly estimates of GDP, which means that there is a discrepancy between the measures. Globalisation has the potential to impact on the size of this discrepancy, which may depend on the choice of price deflator used in estimating chain volume measures.

4.      The document examines clothing and footwear retailing, mining commodities, and international trade in services (including intellectual property products) and how price and volume measures are estimated for Australia

5.      Australia is a small open economy where a small number of large businesses, many of which are multinational enterprises (MNES), significantly contribute to the value added of the economy. The presence of these MNEs and the manner in which they operate has made it increasingly difficult to apply the appropriate price index to deflate nominal values of output. Although not discussed in this document an important area to consider is industry and product classifications and the level at which data is collected.

6.      The ABS produces a range of price indexes suited to different parts of the economy. Prices are measured by recording the cost of a good or service that is paid at the time of purchase. The prices are measured over time, taking into account quality change for a particular product. Within the national accounts quantity revaluation can be used to in some cases to estimate growth in volumes.

# II. Clothing and Footwear Retailing

7.      The increase in multinational firms in the Australian clothing retail industry has seen greater competition, which has in turn seen weaker price growth. These larger firms are able to keep costs in check due to economies of scale that they are able to achieve globally. Consumers now have greater access to international markets, such that they can now buy direct from the international parent company. While these online overseas purchases can be estimated and included in *household final consumption expenditure* (HFCE) the price index used to deflate these estimates will likely reflect the domestic price rather than the actual price paid overseas.

8.      Figure 1 compares the domestic and imported prices for clothing and footwear. The figure shows that these two prices have been moving in different directions. If consumers

are switching from domestic to direct purchases from overseas, but the HFCE estimate continues to be deflated using a domestic price index, then depending on the price differential HFCE may be over or under estimated. However, it is worth noting that these overseas purchases are also captured in the import statistics, where a different price deflator will be used. The implicit price deflator in figure 1 is based on the International Trade Price Index, and is not necessarily representative of the overseas price that a household would pay. The price that the household would pay would be that of the CPI of the country of purchase.

Figure 1
**Domestic and imported prices for clothing and footwear prices (Index)**
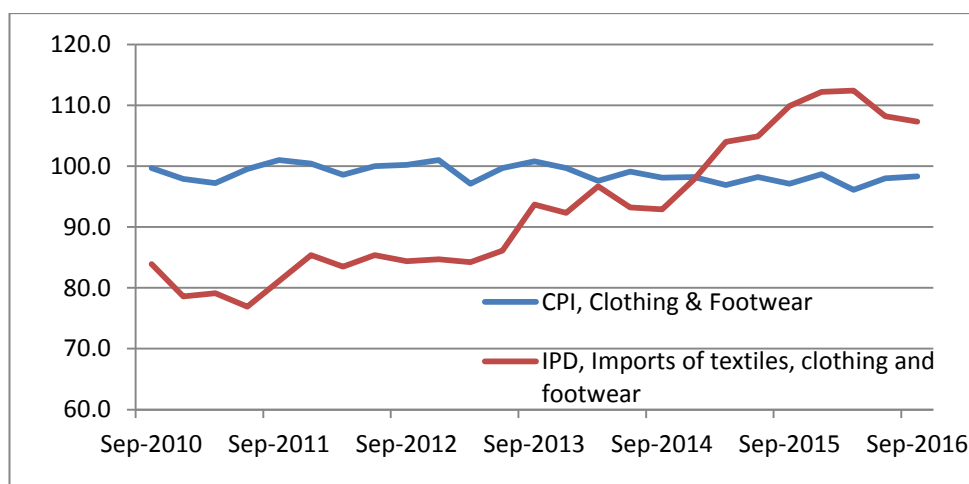


## III. Mining Commodities

9.      Australia is a significant exporter of mining products, especially of coal and iron ore. Over the coming years, exports of liquefied natural gas will also increase significantly. Australia's mining industry is dominated by large MNEs, both domestically and foreign owned. Exported mining commodities from Australia take several weeks to arrive at the destination port. Often the value of the exports initially reported will not be the final price actually paid or received. This is regularly the case for goods with extremely volatile prices such as mining commodities. These mining goods are valued when they are loaded onto ships, however when they arrive they may be revalued before payment, due to fluctuations in the price. This flows through as revisions in the subsequent quarter. The exporter will revise their nominal value that occurred during transit. However, the Producer Price Index and International Trade Price Index (ITPI) estimates are not revised, and as such the change in price that occurred during transit comes through as a revision to the *chain volume measure* (CVM) of GDP.

10.     Using published data, Figure 2 highlights the revision to growth rates for CVM for mining exports. The figure also includes quarterly growth rates for the relevant ITPI, which is not revised to highlight the volatility in this series. As the chart shows, the revisions to CVMs closely align with revisions to the current price values. Using data from the international trade price index (ITPI) it can be observed that when the price of these commodities increases or falls quickly this often leads to a revision in the export estimate in both the current price and volume estimate. This is despite the fact that the revision is likely to be only related to the price of the export rather than the quantity exported. In addition, this complexity also can impact on the statistical discrepancy between the expenditure

measure and the other two approaches, both in the current quarter and the previous quarter being revised, as the revision might not be reflected in the income or production data received. In addition to impact GDP, there are also impacts on other aggregates such as Real Net National Disposable Income, that take into account foreign income flows.

Figure 2
**International trade price index and revisions to growth – Mining commodities exports (%)**
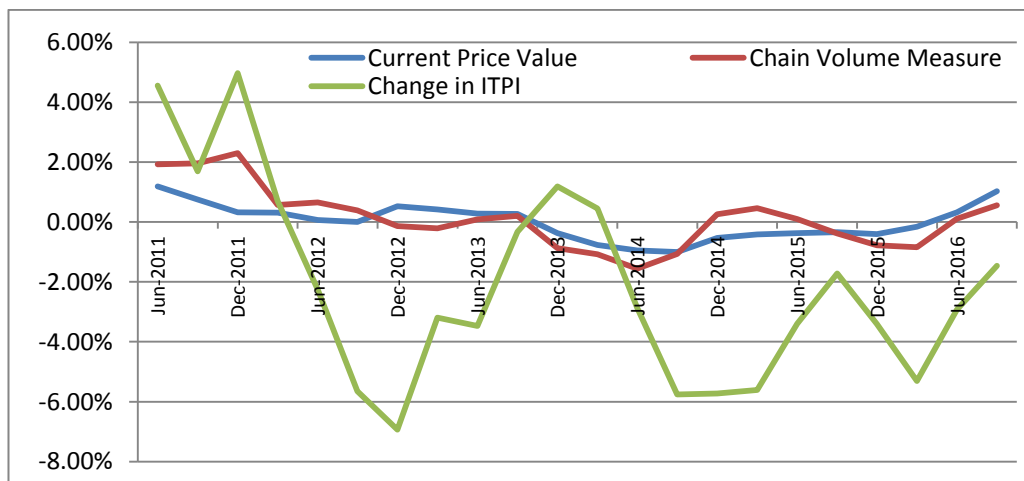


## IV.  Trade in Services

11.    Estimating a price index for services that takes account of quality change is difficult due to the challenges that come from trying to identify a homogeneous product. As services become more individualised the adjustment for quality becomes more difficult. Services, including the export of services, are having a much larger role in the Australian economy. Despite the increased exports stemming from the large ramp up in mining exports, growth in nominal service exports has increased at a faster rate over the past 4 years (see Figure 3). The figure shows the nominal value of exports of both goods and services as an index. Even though the exports of services in nominal terms is growing faster, the value of goods is still around four times greater than services.

Figure 3
**Annualised Index of Nominal Exports of Goods and Services**
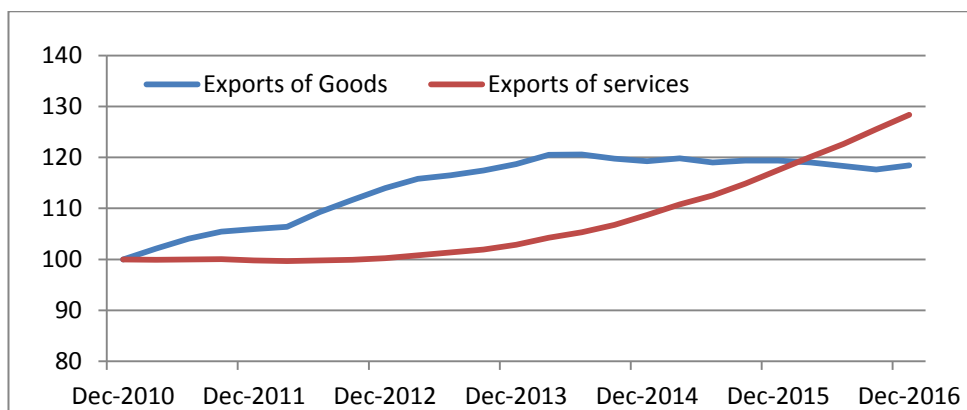
12.    As well as these difficulties a large amount of international trade in services estimates come from modelled data. These are then replaced with actual prices once the source data becomes available. Table 1 outlines the lag between the estimated price being used in the model and when the actual data becomes available. This lag in actual price data means that volume estimates of the value add produced can be revised several quarters after the initial publication.

13.    With the advent of online digital services, such as video streaming, obtaining nominal values is becoming increasingly difficult. There are issues around where the source of the import might be, and this may have implications for trade policy that this document has not addressed. Presumably financial transactions are captured through the financial accounts, and these need to be coherent with imported values. These financial transactions are also a potential data source to track trade data. While this is useful for nominal values the issue of what is the appropriate price index to use for deflating still remains.

Table 1
**Service types**[2]

| Service | Longest Lag in Input Data | Main Data Sources |
|---|---|---|
| Manufacturing services on physical inputs owned by others | 1 Month | Trade in Goods |
| Maintenance and repair services | 1 Month | Trade in Goods |
| Transportation services | 4 Months | SITS, Trade in Goods, Demography, TRA |
| Travel services | 9 Months | Demography, TRA, DIBP, Department of Education, CPI, ad hoc |
| Construction services | 3 Months | SITS |
| Insurance and Pension Services | 5 Years | APRA (including Lloyds of London), ATO, Trade in Goods, FXR |
| Financial Services | 4 Months | National Accounts, SITS |
| Charges for the use of intellectual property | 3 Months | SITS |
| Telecommunication, computer and information services | 3 Months | SITS |
| Other business services | 3 Months | SITS |
| Personal, cultural and recreation services | 3 Months | SITS |
| Government Services | Ad hoc input | DFAT, Demography, AFP, DIBP, State Government, Embassies, International Organisations, FXR, Other |

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[2] SITS; Survey of International Trade in Services, TRA; Tourism Research Australia, DIBP; Department of Immigration and Boarder Protection, CPI; Consumer Price Index, APRA; Australian Prudential Regulatory Authority, ATO; Australian Tax Office, DFAT; Department of Foreign Affairs and Trade, FXR; Foreign Exchange Rate

## V. Conclusion

14. Globalisation is presenting ever increasing challenges for statistical organisations. Even as more products are delivered online, Australia faces timing issues with large corporations that have impacts for quarterly measures of GDP. Further research is required to consider how multinationals operate across borders such that appropriate price indexes are used in the estimation of chain volume measures.

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