

Unclassified

STD/CSTAT/WPNA(2013)16

Organisation de Coopération et de Développement Économiques  
Organisation for Economic Co-operation and Development

16-Sep-2013

English - Or. English

STATISTICS DIRECTORATE  
COMMITTEE ON STATISTICS

**Working Party on National Accounts**

**NATIONAL PRACTICES IN COMPILING NATIONAL ACCOUNTS  
QUARTERLY CURRENT PRICE GROSS VALUE ADDED (GVA) BY INDUSTRY**

**To be held on 3-4 October 2013  
OECD Conference Centre  
Beginning at 9:00 a.m. on the first day**

*This document has been prepared by Tom Lay and Michael Smedes (ABS, Australia) and will be presented under item 17 of the draft agenda*

JT03344464

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**NATIONAL PRACTICES IN COMPILING NATIONAL ACCOUNTS**  
**QUARTERLY CURRENT PRICE GROSS VALUE ADDED (GVA) BY INDUSTRY**

Paper Prepared by Tom Lay and Michael Smedes  
Presented by Michael Smedes (Assistant Statistician, National Accounts Branch)

**INTRODUCTION**

1. The purpose of this paper is to provide details of the work the Australian Bureau of Statistics (ABS) has been undertaking in producing Quarterly Current Price GVA by industry estimates.

**BACKGROUND**

***Measurement of Gross Domestic Product (GDP)***

2. GDP can be measured using three different approaches. These are the:

- Expenditure approach, referred to as GDP(E)
- Income approach, referred to as GDP(I) and
- Production approach, referred to as GDP(P).

3. The ABS is one of the few National Statistics Offices (NSO) in the world to compile all three of these measures quarterly. The current practice within the ABS is to compile all three measures independently and then publish these as part of the annual and quarterly National Accounts. The simple average of all three measures called GDP(A), is the ABS's official measure of GDP and is the measure quoted by media commentators and analysts.<sup>1</sup>

4. In principle, the three measures of GDP should give the same result, but in practice they differ due to limitations of data sources. These limitations include sampling error, reporting error, incomplete coverage in the numerous individual data sources, and variations in the timing of recording of transactions. As a result of publishing GDP(A), the ABS also publish a statistical discrepancy item which shows the difference between each of the three measures and GDP(A). Large and persistent statistical discrepancies relative to GDP can indicate gaps in the coverage of components or other quality issues.

5. On an annual basis the three measures of GDP are balanced within the supply and use tables for all years except for the latest year. However on a quarterly basis the ABS publish unbalanced measures and a statistical discrepancy exists for all three measures. In general these statistical discrepancies tend to be small relative to GDP. This is largely because the quarterly estimates are benchmarked to the annual balanced measures, but also because as part of the quarterly compilation process, the statistical discrepancy

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<sup>1</sup> Further information can be found in "Spotlight on National Accounts, May 2011 (ABS 5202.0)  
<http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/5202.0Main+Features1May%202011>

is closely monitored. The aim of this process is to investigate further any significant divergences between the three measures and correct potential weaknesses or gaps in either of the measures.

6. While the statistical discrepancy is expressed as the difference between each of the three measures and the headline measure, it is important to note that users tend to place more emphasis on the expenditure measure of GDP. This is because their forecasting models are based on variables on the expenditure side of the economy. Therefore it is the difference between GDP(E) to GDP(P) and the difference between GDP(E) to GDP(I) that is important from a user's perspective.

### ***Quarterly Current Price GVA Development***

7. Following the release of the 2008/09 Australian System of National Accounts (ABS 5204.0) in late 2009, there was a significant increase in the size of the statistical discrepancy. One of the main reasons for this was the onset of the Global Financial Crisis (GFC) which saw a divergence in the various indicator series coming through from the key source data areas. For Australia, one of the major impacts of the GFC was the significant depreciation in the Australian dollar relative to other major currencies. There was also significant decline in the price of commodities important to Australia such as iron ore and coal.

8. This heightened period of price volatility created a divergence between the current price measures of GDP(E) and GDP(I). This divergence was largely driven by an inconsistency in the timing of which price movement's impact on the respective measures. This divergence is further amplified by the fact that to obtain the volume measure of GDP(I), the current price measure is deflated using the Implicit Price Deflator (IPD) from GDP(E).

9. In response to the experiences during this period, the ABS has been experimenting with the use of internal confrontation tools to improve the coherence of the three measures. The Quarterly Supply and Use (QSU) model<sup>2</sup> was developed initially and provided a tool for reconciling the production and expenditure measures of GDP.

10. Recently the ABS has been developing Quarterly Current Price GVA estimates as a way of reconciling the expenditure and income measures of GDP. From an accounting perspective it is not possible to directly confront GDP(E) and GDP(I). The broad strategy adopted by the ABS is to indirectly reconcile the two using GDP(P). This is achieved by using the quarterly current price GVA estimates to reconcile GDP(P) and GDP(I). While the QSU model aims to reconcile GDP(E) and GDP(P).

11. The following sections of this paper provide a general update of this work including a description of the conceptual framework, key data sources, methodology along with some preliminary results.

### **CONCEPTUAL FRAMEWORK**

12. Currently on a quarterly basis, there is no method available to link the production and income measures of GDP. On the production side, the ABS compiles chain volume measures of GVA by Industry. While on the Income side, the components of GDP(I) are compiled at current prices by sector only with no industry dimension. GDP(I) at current prices is deflated using the IPD from the expenditure measure of GDP to obtain a chain volume estimate.

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<sup>2</sup> Details on the QSU model can be found in ABS 5258.0: <http://www.abs.gov.au/AusStats/ABS@.nsf/MF/5258.0>

13. It is possible to build up a current price estimate of GVA from the Income side of GDP. This follows from the conceptual relationship that GVA can be distributed as either factor incomes or as flows to and from the Government. This relationship is represented as follows:

Current Price GVA = Compensation of Employees (COE)  
+ Gross Operating Surplus (GOS) and Gross Mixed Income (GMI)  
+ Other Taxes on Production  
- Other Subsidies on Production

14. Obtaining current price GVA from the income side provides one way of reconciling the production and income measures of GDP. Using this information, an IPD can be obtained by dividing the current price GVA by the chain volume measure. This IPD can be confronted with other comparable price measures to provide an indicator of the overall quality of the production and income measures. The IPD also provides a useful way of monitoring any growth in the Statistical Discrepancy by highlighting potential weaknesses in the estimates. The industry breakdown of GVA provides an additional dimension in terms of undertaking this reconciliation and is particularly useful for industries which exhibit volatile price movements such as mining

## **DATA SOURCES**

15. In general, quarterly current price GVA by industry estimates are produced by moving forward the annual estimates of COE, GOSMI, Taxes and Subsidies using the best available quarterly indicator series to obtain the quarterly estimates. These quarterly indicator series are based on a few key data sources:

### ***Quarterly Business Indicator Survey (QBIS)***

16. QBIS is an ABS quarterly sample survey of approximately 16,000 units within the private non-financial sector. The survey covers most Australian and New Zealand Industrial Classification (ANZSIC)<sup>3</sup> industries, however there are some exclusions such as Agriculture, Forestry and Fishing, and Public Administration and Safety industries. Businesses completing this survey are asked to report quarterly data for Sales of Goods and Services, Wages, Profits and Inventories. The results from this survey provide key industry data within the private non-financial sector.

### ***Government Finance Statistics (GFS)***

17. GFS captures the financial transactions of the National, State and Local Governments of Australia and public non-financial corporations. These transactions include the government's spending, lending, taxation and borrowing activities. The majority of GFS data is collected directly from a standard reporting framework by the Commonwealth and State Government Treasuries. However data for some general government and public non-financial corporation units are also obtained from an ABS quarterly survey. GFS is the key data source for the public sector component of this work.

### ***Australian Prudential Regulatory Authority (APRA)***

18. APRA is the Australian regulator of the Financial Corporations sector including Authorised deposit taking institutions (Banks, Credit Unions and Building Societies), insurance corporations (Life and

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<sup>3</sup> Australian and New Zealand Standard Industrial Classification (ANZSIC), 2006 (ABS 1292.0)

[http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1292.0Main+Features12006%20\(Revision%202.0\)?OpenDocument](http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/1292.0Main+Features12006%20(Revision%202.0)?OpenDocument)

General) and pension funds. As part of the regulatory framework, these entities are required to submit monthly and quarterly forms covering balance sheet and income and expenditure data. The ABS receives this data on a quarterly basis and this is the key data source for the Financial Corporations sector and the Finance and Insurance industry.

### ***Australian Bureau of Agriculture and Resource Economics and Sciences (ABARES)***

19. ABARES is a research organisation focussing on the Agriculture, Forestry and Fishing industry. As part of the role of ABARES, they produce a number of statistical publications covering various aspects of this industry including production volumes of commodities as well as input costs of production. This is the main data source used to produce quarterly GVA estimates for the agriculture, forestry and fishing industry.

### **COMPILATION METHODOLOGY**

20. This work can be viewed as an extension of what is currently produced for the annual national accounts (ABS 5204.0). Within this publication, annual estimates of Total Factor Income (i.e. Compensation of Employees and Gross Operating Surplus/Mixed Income) by industry are produced from the Supply and Use tables. Quarterly estimates of Compensation of Employees and Gross Operating Surplus/Mixed Income can be obtained by moving forward the annual amounts using the best available quarterly indicator series. By developing quarterly industry estimates of other taxes and subsidies on production, a current price GVA by industry estimate can be produced.

21. The compilation methodology of the following components of GVA are outlined below:

#### ***22. Compensation of Employees (COE)***

- The starting point are the annual COE by industry estimates produced within ABS 5204.0.
- Each industry is analysed to determine its public and private sector contribution. These are obtained using information from the 2010-11 Survey of Major Labour Costs which provides the number of public and private sector employees classified by industry.
- For industries where the public sector contribution is less than 20% of employees, the wages indicator from the QBIS is used to move forward the annual amounts to obtain the quarterly estimates.
- For industries where the public sector contribution is greater than 20% of employees, a combination of indicator series are used to move forward the annual amounts into quarterly estimates. These are the wages indicator from QBIS and public sector wages and salaries from GFS. These indicator series are applied to the annual estimates based on their relative public/private sector contribution.

#### ***23. Gross Operating Surplus/Mixed Income (GOSMI)***

- Annual estimates of GOSMI by industry and by institutional sector are compiled as part of the ASNA and these are used as the starting point for developing the quarterly industry estimates. GOSMI for each industry is constructed by adding together the GOSMI for the following sectors:

*Private non-financial corporations*

- Private non-financial corporations GOS by industry estimates are primarily obtained by applying the profits indicator for corporations from QBIS to move forward the annual benchmark amounts to obtain the quarterly estimates.
- Agriculture, forestry and fishing industry estimates, which is out of scope of the QBIS sample are generated based on information sourced from ABARES.
- For other industries which are out of scope, a linear trend interpolation is applied to the annual estimates to generate quarterly series

*Public non-financial corporations*

- Public non-financial corporations by industry estimates are obtained by applying a GFS indicator series to move forward the annual benchmark amounts into quarterly estimates. This indicator is based on quarterly income and expenditure data and is used to construct an indicator for GOS.

*Financial corporations*

- Financial corporations sector GOS is currently published as part of ABS 5206.0 and is largely based on information from APRA. As part of developing these experimental estimates, an assumption is made that the financial corporations sector is equal to the Finance and Insurance industry. There are some cases where this assumption does not hold eg. the Central Bank is part of the Financial corporations sector but is part of the Public Administration and Safety Industry within ANZSIC. These scope differences are expected to have only a small impact on the overall results.

*General Government*

- By convention, the value of general government gross output is measured as the cost of producing that output, including consumption of fixed capital. Therefore General government GOS is equivalent to the value of consumption of fixed capital on general government assets. On an annual basis, general government consumption of fixed capital by industry estimates are produced using ABS Perpetual Inventory Model (PIM). A linear trend interpolation is applied to these annual estimates to obtain the quarterly estimates.

*Household/Unincorporated*

- Gross Mixed Income (GMI) is the gross income earned from production by unincorporated enterprises. Quarterly estimates of GMI by industry are obtained by applying the profits indicator of unincorporated enterprises from the QBIS to move forward the annual benchmark amounts to obtain the quarterly estimates.
- There are some industries where the quality of QBIS data for unincorporated enterprise profits is low, and so other indicator series are preferred. For the Construction industry, the ABS Building Activity Survey provides quarterly estimates of the “Value of construction work done” and this is used as the indicator series to produce the quarterly estimates. While for the Health care and social assistance in industry, movements in household final consumption expenditure on doctors and dentists is used to produce quarterly estimates.
- Estimates for the Agriculture, Forestry and Fishing industry, which is out of scope of the QBIS sample, are generated based on information sourced from ABARES.

24. *Taxes/Subsidies on Production*

- Annual estimates of Other taxes less subsidies on production by industry are produced as part of the 5204.0 release and are used as the starting point for producing quarterly estimates.
- A single quarterly indicator series is constructed by aggregating all known taxes on production and subtracting an amount for total subsidies. These are sourced from quarterly GFS data.
- Known taxes on production are those taxes for which quarterly estimates are available. These are Payroll tax, taxes on capital and financial transactions, motor vehicle tax, land tax and municipal rates.
- This indicator series is applied to the annual estimates for all industries to produce the quarterly estimates.

**PRELIMINARY RESULTS**

25. Results have been produced for the June quarter 2013 with a time series back to March 2001. At this stage, these estimates are only used for ABS internal confrontation and there is still considerable analysis and refinement that needs to be undertaken before they are suitable for publication to users.

26. The industry IPD estimates have so far produced mixed results. For some industries, the movements in the IPD compare well with comparable price indicators for the same industry. In general these have tended to be in goods producing industries such as mining and manufacturing. For these industries, the IPD have been immediately useful in informing the reconciliation process through identifying quarterly IPD movements which do not track well with other price measures.

27. The ABS has found that quarterly deviations between the IPD and other price measures in general, are predominantly driven by GOSMI rather than COE or Taxes/Subsidies. This is due to the residual nature of GOSMI where data providers may report large amounts for one-off income and expenses eg. Large one-off payments made to head offices resulting in a sharp fall in GOSMI.

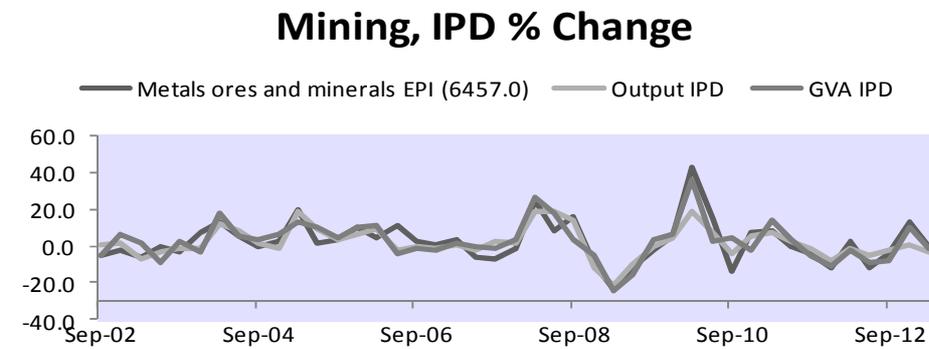
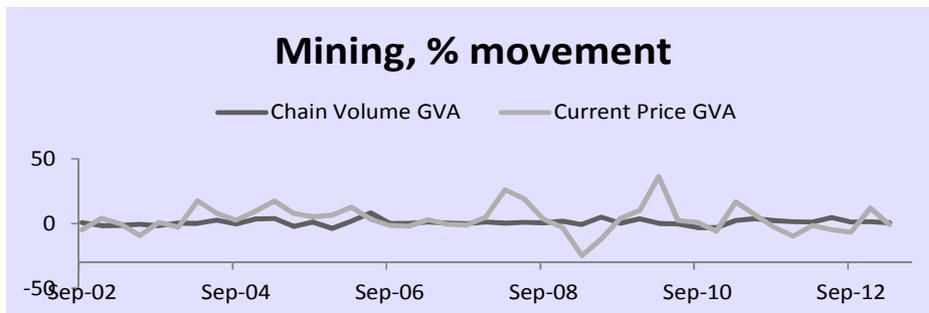
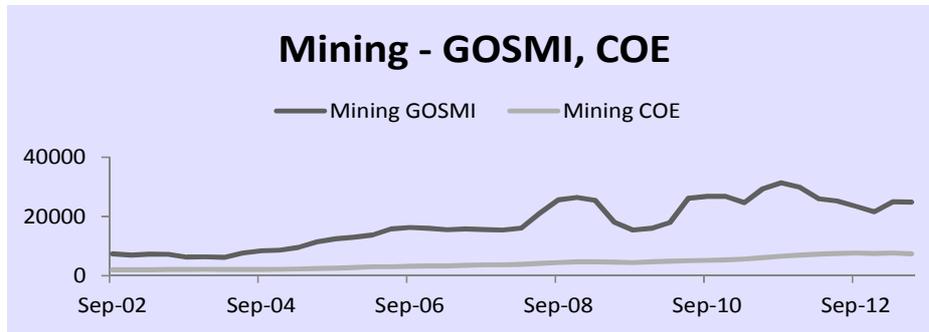
28. On the other hand, there are some industries where the IPD do not follow the movements of other price indicators. In general, these have been found to be in service based industries such as Professional, Scientific and Technical services industry. The IPD in these types of industries are volatile and it is difficult to justify significant movement in prices on a quarterly basis. Further investigation is required here to determine what is driving the movements in the IPD.

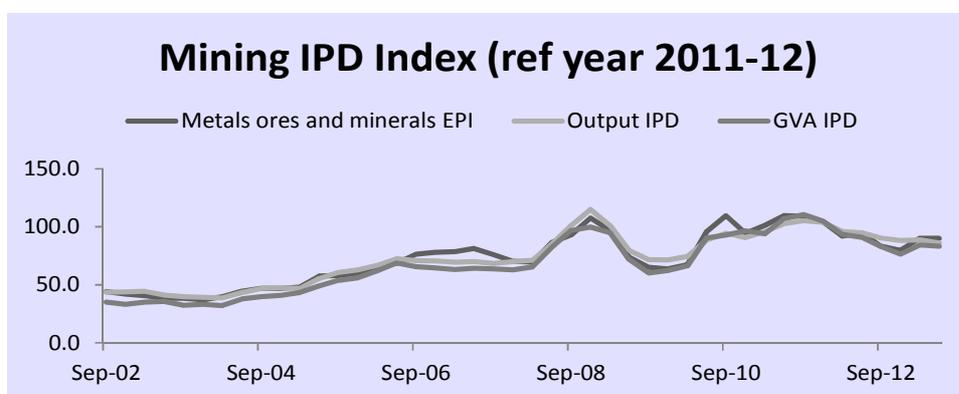
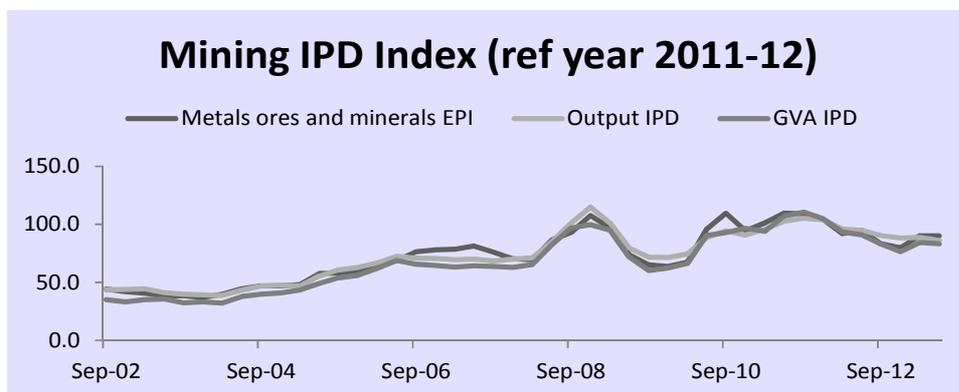
29. Results for selected industries are presented below.

30. For each industry below, 4 sets of graphs are presented:

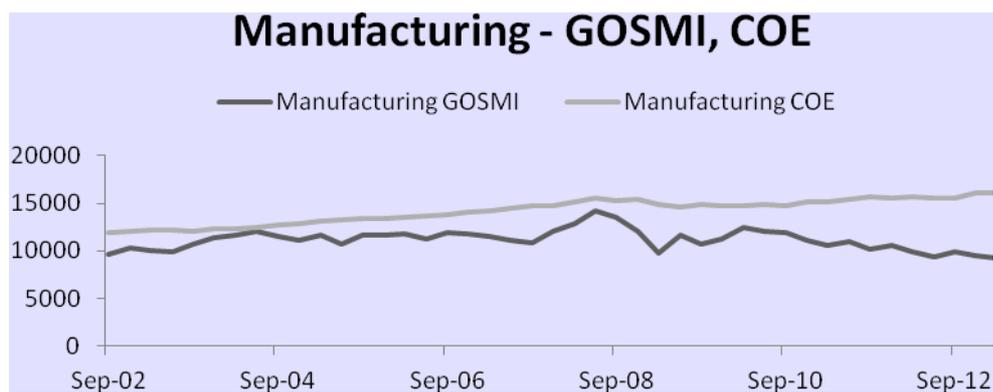
- Current Price estimates of COE and GOSMI (\$millions)
- Current price and Chain volume estimates of GVA (\$millions)
- GVA IPD and other comparable price indicators (% changes)
- GVA IPD and other comparable price indicators (index numbers)

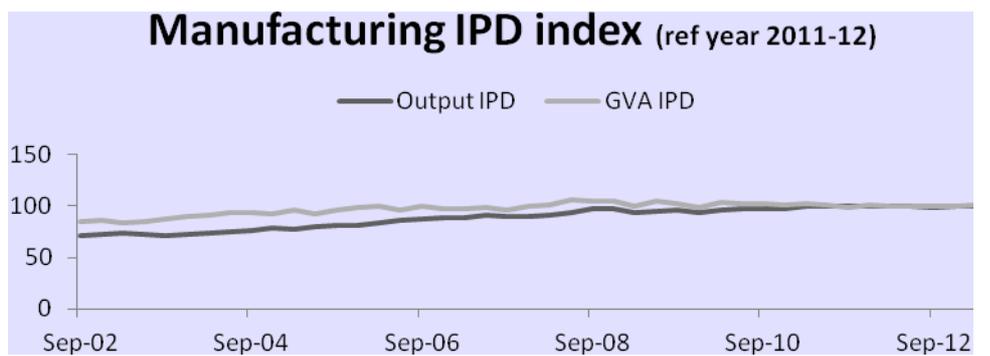
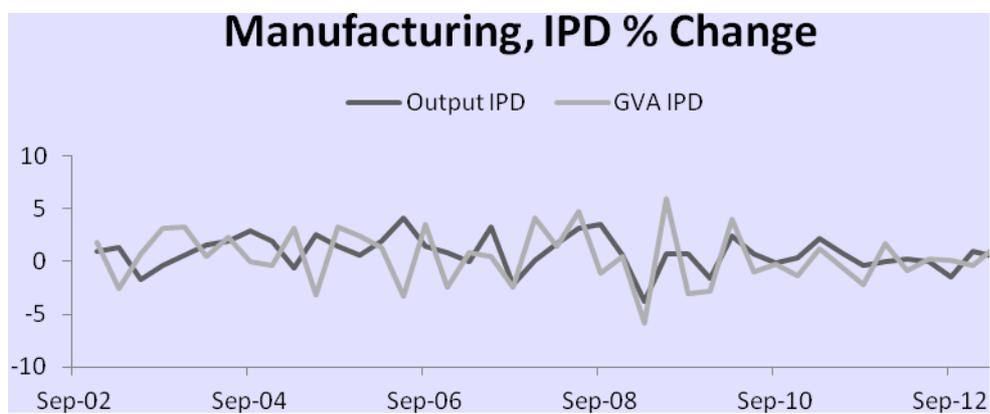
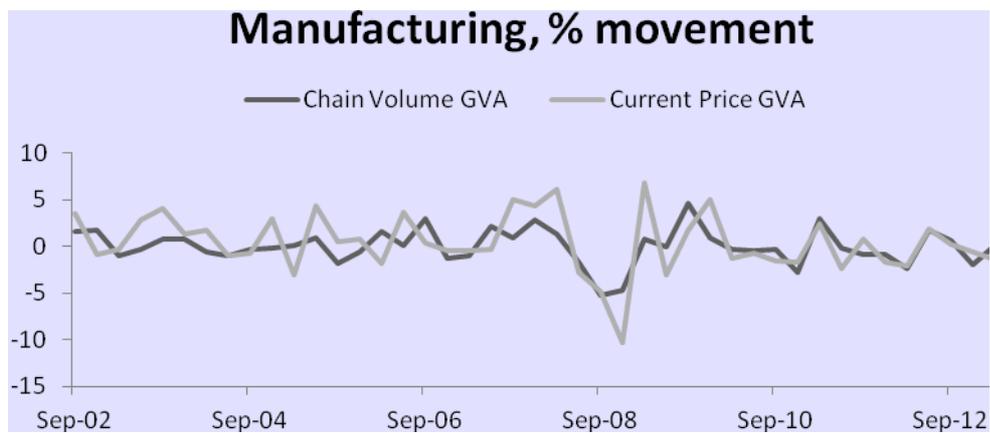
## MINING



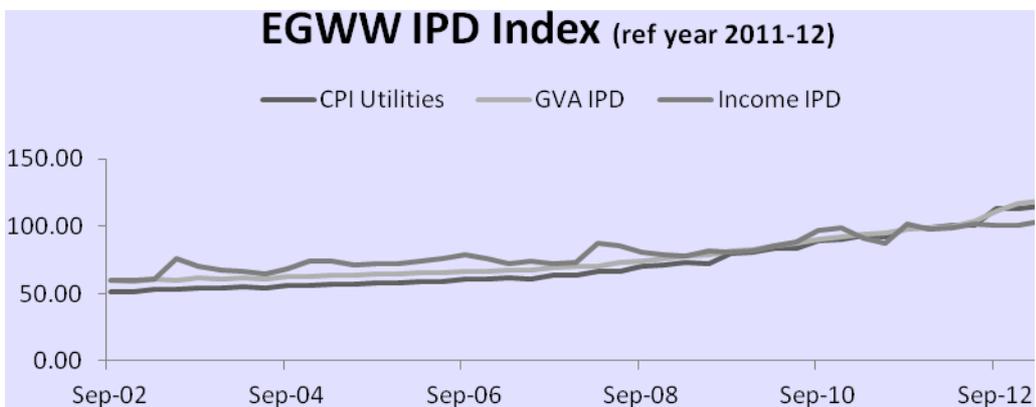
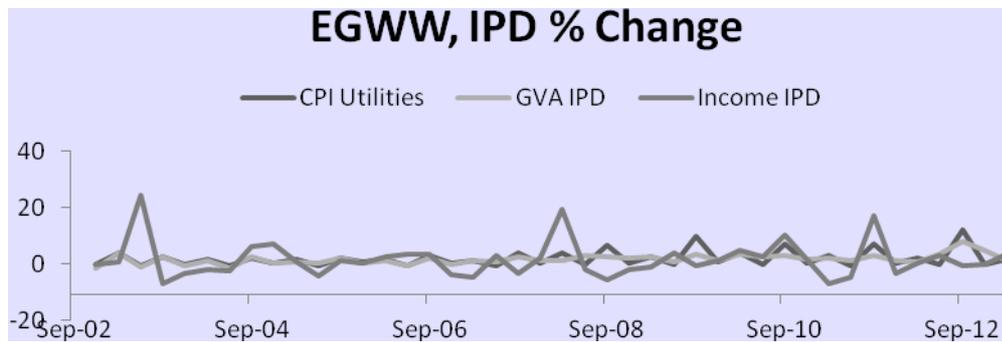
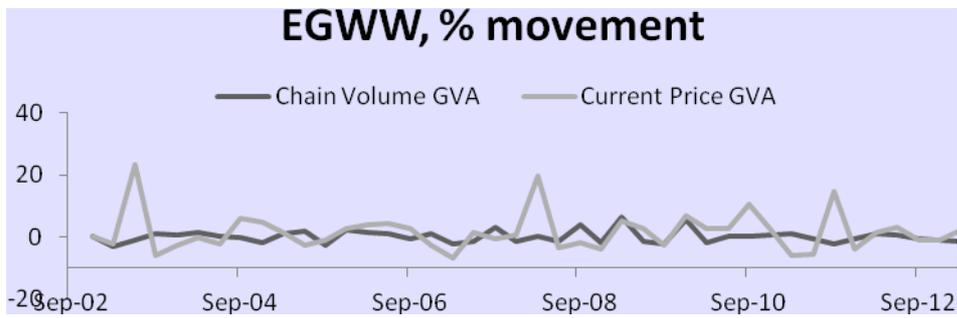
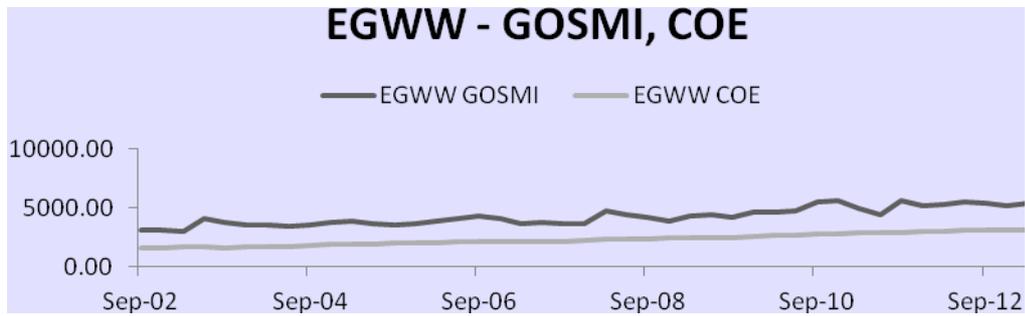


## MANUFACTURING





## ELECTRICITY, GAS, WATER AND WASTE SERVICES



## CONCLUSION

31. Development of quarterly current price GVA estimates is still a 'work in progress' at this point. As mentioned earlier there is still some considerable analysis and refinement of the industry estimates that the ABS will be undertaking in the next few months. One of these is to improve the Taxes compilation methodology to allocate specific taxes to the industries where the tax burden falls eg. Allocating payroll tax to labour intensive industries, and taxes on pollution to the Electricity, Gas, Water and Water Services Industry.

32. The ABS has already commenced using these estimates as part of the quarterly national accounts compilation process. This has been a valuable exercise to undertake as it provides a way of isolating potential weaknesses in the production or income estimates as well as identifying the industries that might require further investigation. This provides a good basis to reanalyse source data and confront these with other indicators to ensure a coherent picture of the economy.

33. The ABS will be aiming to release an information paper in late 2013 to inform users of this work as well as to gauge their interests. If there is sufficient demand, the ABS will also consider the option to make these estimates available as part of future releases of the quarterly National Accounts.