# H Additional information on Metal products

Additional data about the Metals products (MP) subsector (which is chiefly discussed in chapter 6) are presented in this appendix. It provides a longer-term view of how the composition of the subsector has changed through time by examining different output series and price deflators. This appendix also includes information about trade, a broader discussion of ‘capital-lags’ (and how they relate to the subsector), and a closer look at different labour input measures for MP.

## H.1 A longer-term view of the composition of Metal products

In chapter 6, the composition of the MP subsector was discussed in terms of the share that each subdivision comprised of value added (VA), hours worked and private new capital expenditure in 2009-10. Figure H.1 shows how these shares have changed over the period covering cycle 3 through to the incomplete cycle.

Figure H.1 Composition of Metals products — value added, hours worked and investment

Percentage shares

|  |  |
| --- | --- |
| *Value added* | *Hours worked* |
|  |  |
| *Private new capital expenditure*a |  |
|  |  |

a Current price data used for value added and private new capital expenditure. Data for net capital stock are not available at this level of disaggregation.

*Data sources*: ABS (unpublished Survey of New Capital Expenditure data); ABS (*Australian Industry,* various issues,Cat. no. 8155.0); ABS (*Australian Manufacturing,* various issues,Cat. no. 8221.0); ABS (unpublished Labour Force Survey data).

As with other subsectors, examining the value added growth at the subdivision level is difficult because there is no *real* measure of value added published for the MP subdivisions. This is particularly important for the MP subsector as large changes in prices for metal products, particularly primary metals, occurred over cycle 4.

As with Petroleum, coal, chemical and rubber products, table H.1 shows that it is difficult to reconcile estimates of real growth derived from data available for the MP subdivisions with that of the subsector. For example, real value added growth for MP was 1.3 and 4.5 per cent a year in cycles 3 and 4, respectively. However, the subdivision data (deflated using output producer price deflators[[1]](#footnote-1)) give growth rates of 6.7 and 1.4 per cent a year in those cycles — reversing the trends of growth. Real sales and service income also suggests faster growth in cycle 3 than in cycle 4.

One reason for the discrepancy is that the value added data for the subsector and the subdivisions come from different sources. The subdivision data are sourced from publications based on the *Manufacturing Census* and *Economic Activity Survey*. The subsector estimates from the ABS National Accounts are compiled using these surveys and other sources.

Despite these discrepancies, the subdivision estimates for real value added and real sales and service income show higher growth in Fabricated metals than Primary metals over cycle 4. It is for this reason that chapter 6 concludes that the real value added growth for MP reported in the National Accounts in cycle 4 is more likely to have come from Fabricated metals rather than Primary metals. The Bureau of Resource and Energy Economics data in table 6.3 also provide little evidence of output volume growth of primary metal products over cycle 4.

Table H.1 Comparison of output measures and prices for Metal products

Average annual growth rate (per cent)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Cycle 3 | Cycle 4 | Incomplete cycle |
| **Value added** |  |  |  |
| **MP (real)**a | **1.3** | **4.5** | **0.3** |
|  |  |  |  |
| Primary metal product mfg (nominal) | 10.6 | 10.6 | -12.1 |
| Fabricated metal product mfg (nominal) | 5.8 | 11.7 | -0.5 |
| *Sum of subdivisions (nominal)* | *8.4* | *11.1* | *-6.7* |
|  |  |  |  |
| Primary metal product mfg (real)b | 8.9 | -2.6 | -10.2 |
| Fabricated metal product mfg (real)b | 3.8 | 6.8 | -3.9 |
| *Sum of subdivisions (real)*b | *6.7* | *1.4* | *-7.0* |
| **Sales and service income**c |  |  |  |
| Primary metal product mfg (nominal) | 9.3 | 13.2 | -10.9 |
| Fabricated metal product mfg (nominal) | 9.9 | 10.3 | -1.3 |
| *Sum of subdivisions (nominal)* | *9.5* | *12.2* | *-7.4* |
|  |  |  |  |
| Primary metal product mfg (real) | 3.8 | -2.1 | -16.9 |
| Fabricated metal product mfg (real) | 7.7 | 4.7 | -5.0 |
| *Sum of subdivisions (real)* | *4.7* | *-0.1* | *-12.7* |
| **Price deflators** |  |  |  |
| Output PPI: Primary metal product mfg | 1.6 | 13.5 | -1.9 |
| Output PPI: Fabricated metal product mfg | 2.0 | 4.6 | 3.7 |
| *Output PPI: MP*d | *1.7* | *9.4* | *0.3* |
|  |  |  |  |
| Input PPI: Primary metal product mfg | 2.2 | 16.1 | 9.0 |
| Input PPI: Fabricated metal product mfg | 1.4 | 8.7 | -2.5 |
| *Input PPI: MP*d | *1.8* | *12.4* | *3.0* |
|  |  |  |  |
| *Sales and service income: MP*d | *4.5* | *12.3* | *6.1* |

a National accounts chain volume measure of MP value added b Deflated series using output prices from ABS *Producer Price Indexes* (PPI) publication. The ‘sum of subdivisions’ series generated by estimating a PPI for MP by using subdivision PPIs and current price value added weights. c Sales and service income from ABS *Business Indicators* publication. The real ‘sum of subdivisions’ series generated by estimating a price deflator for MP by using subdivision deflators and current price sales and service income weights. d Deflators estimated using relevant subsector deflators weighted by nominal sales and service income shares.

*Sources*: Authors’ estimates based on ABS (*Australian System of National Accounts*, 2010-11, Cat. no. 5204.0); ABS (*Business Indicators, Australia,* *September 2012*, Cat. no. 5676.0) and ABS (*Producer Price Indexes, Australia, December 2012*, Cat. no. 6427.0).

## H.2 Trade in metal products

Unlike much of Manufacturing, Australia has a trade surplus in metal products, although this surplus narrowed over cycles 3 and 4 (figure H.2). While additional steel imports have played a role in narrowing this gap (figure 6.6), more disaggregated data indicate that the bulk of the trade movement has been driven by changes in the rate of import and export of refined gold.

Figure H.2 Real exports and imports of metal products

2009-10 $m

|  |
| --- |
|  |

*Data sources*: Authors’ estimates based on ABS (*International Trade in Goods and Services*, various issues, Cat. no. 5368.0); and ABS (*International Trade Price Indexes, Australia,* various issues, Cat. no. 6457).

Changes in the Australian and New Zealand Standard Industrial Classification (ANZSIC) for Metal products make it difficult to identify the parts of the subsector experiencing changes in the volume of trade. An alternative classification system, the Standard International Trade Classification (SITC), allows metal products to be disaggregated into different product groups, but not ones that concord to Primary or Fabricated metals under an ANZSIC system. Data on the changes in these SITC groups (in real terms) are presented in table H.2.

The only groups to see real export growth over cycle 4 were alumina and gold-related products. The growth in alumina exports is consistent with the growth in alumina production discussed in chapter 6. All of the SITC MP product groups experienced a growth in imports with iron, steel and gold-related groups showing the greatest increases in import volumes over cycle 4. However, between cycles, the strongest growth in both imports and exports was in gold-related products, which corresponds to Australian operations that import gold, refine it further and then re‑export it (ABARE 2008).

Table H.2 Real exports and imports of metal products on an SITC basis**a**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Cycle 3 | |  | Cycle 4 | |  | Difference | |
|  | *Growth* | *Contrib.* |  | *Growth* | *Contrib.* |  | *Growth* | *Contrib.* |
| *Exports* | % py | % pts |  | % py | % pts |  | % py | % pts |
| 285: Aluminium ores and  concentrates (incl. alumina)b | 4.9 | 0.5 |  | 5.8 | 0.8 |  | 0.8 | 0.1 |
| 67: Iron & steel | -11.4 | -0.7 |  | -1.9 | -0.1 |  | 9.5 | 0.7 |
| 68: Non-ferrous metals | 1.4 | 0.3 |  | -1.2 | -0.3 |  | -2.6 | -0.7 |
| 69: Manufactures of metals, nesc | -1.2 | 0.0 |  | -6.9 | -0.2 |  | -5.7 | -0.1 |
| 97: Gold, non-monetary (excl. gold  ores & concentrates) | -5.7 | -3.2 |  | 6.2 | 3.4 |  | 11.9 | 6.6 |
| **Total exports** | **-3.1** | **-3.1** |  | **3.6** | **3.6** |  | **6.6** | **6.6** |
| *Imports* |  |  |  |  |  |  |  |  |
| 285: Aluminium ores and  concentrates (incl. alumina)b | -2.4 | 0.0 |  | 9.3 | 0.0 |  | 11.7 | 0.0 |
| 67: Iron & steel | 5.3 | 0.9 |  | 6.9 | 1.3 |  | 1.5 | 0.3 |
| 68: Non-ferrous metals | -3.9 | -0.4 |  | 7.3 | 0.6 |  | 11.2 | 1.1 |
| 69: Manufactures of metals, nes | 6.9 | 1.3 |  | 10.5 | 2.2 |  | 3.6 | 0.9 |
| 97: Gold, non-monetary (excl.  gold ores & concentrates) | -1.5 | -0.8 |  | 14.3 | 7.4 |  | 15.8 | 8.2 |
| **Total imports** | **0.9** | **0.9** |  | **11.5** | **11.5** |  | **10.6** | **10.6** |

a Contributions do not add to total due to rounding. b Deflated using additional United Nations trade data and should be treated as indicative only. Note that category 285 is very small in terms of the real value of imports, hence its near zero contribution. c Export price deflators for category 69 are unavailable, and so are deflated by category 68 instead. Data for this row should be treated as indicative only.

*Sources*: Authors’ estimates based on ABS (*International Trade in Goods and Services*, various issues, Cat. no. 5368.0); ABS (*International Trade Price Indexes, Australia,* various issues, Cat. no. 6457.0); and UN (2013).

#### Effective rates of assistance

The combined value of budget and tariff assistance to both MP and Manufacturing, expressed as a share of their value of output, has been constant at around 5 per cent (figure H.3) since the mid-1990s. Additional data regarding the effective rates of assistance for Primary and Fabricated metals are available prior to 1996-97.[[2]](#footnote-2) These data show that the effective rate of assistance for Fabricated metals was relatively higher than that of Primary metals.

Figure H.3 Effective rates of assistance, Metal products and Manufacturing**a**

Per cent

|  |
| --- |
|  |

a Breaks in the series are represented by gaps in the chart, and overlaps are included to show the effects of the methodological and data changes made in moving between series.

*Data source*: PC (2011).

## H.3 Input-output linkages of Metal products

As discussed in section 6.2, the use of output from Metal products has changed over the period of cycles 3 and 4. An increasing share of Fabricated metals and Basic ferrous metal products are being used in construction, with a lesser share being used in other parts of Manufacturing. Table H.3 provides additional data on the value of products supplied by Metal products and its two subdivisions to other parts of the economy.

Broadly speaking, the share of Metal products output that is exported or used by Construction and Mining has been rising through time (mainly) at the expense of use by domestic Manufacturing. At the subdivision level, it becomes clear that the growth in exports was being driven by Primary metals, where strong growth in metal prices led to a higher value of exported products (although not necessarily a higher volume of exports). The growth in the Metal products used by Construction and Mining is mainly Fabricated metals, but also ‘Basic ferrous metals’ and ‘Basic ferrous metal products’ groups within Primary metals.

Table H.3 Downstream users’ share of total supply**a** from Australian Metal product manufacturing

Percentage shares

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Metal productsb | | ME and transportc | | Total Mfg | | **Constr.** | | **Mining** | | Total industry uses | | Exports | | Final use (net of exports) |
| *Metal products* | |  | |  | |  | |  | |  | |  | |  | |
| 1994-95 | 27.2 | | 12.4 | | 46.1 | | **11.9** | | **1.5** | | 68.2 | | 26.5 | | 5.3 |
| 2001-02 | 20.5 | | 8.8 | | 35.1 | | **11.4** | | **1.8** | | 57.7 | | 38.1 | | 4.2 |
| 2008-09 | 21.5 | | 9.9 | | 34.2 | | **14.3** | | **2.8** | | 59.2 | | 36.2 | | 4.6 |
| *Primary metals* | |  | |  | |  | |  | |  | |  | |  | |
| 1994-95 | 34.4 | | 15.2 | | 52.5 | | **3.5** | | **0.6** | | 59.3 | | 38.9 | | 1.8 |
| 2001-02 | 25.1 | | 9.3 | | 37.6 | | **4.9** | | **1.1** | | 46.4 | | 53.2 | | 0.4 |
| 2008-09 | 26.0 | | 10.8 | | 38.7 | | **5.8** | | **0.9** | | 48.5 | | 49.9 | | 1.6 |
| *Fabricated metals* | |  | |  | |  | |  | |  | |  | |  | |
| 1994-95 | 14.5 | | 7.4 | | 34.9 | | **26.7** | | **3.0** | | 84.0 | | 4.6 | | 11.4 |
| 2001-02 | 10.8 | | 7.6 | | 29.7 | | **25.2** | | **3.4** | | 82.0 | | 5.7 | | 12.3 |
| 2008-09 | 10.8 | | 7.6 | | 23.5 | | **34.4** | | **7.3** | | 84.5 | | 3.9 | | 11.7 |

a The last three columns in the table sum to 100 and represent ‘total supply’. Total supply is the sum of all final uses (including export) and total industry use. Input-output tables are based on value (current prices) rather than volume measures. b There are some concordance issues between the ANZSIC93 and ANZSIC06. For better concordance with ANZSIC06, Metal products in 1994-95 and 2001-02 *include* Prefabricated buildings. c ‘Machinery and equipment and transport’. Refers to 28 Machinery and equipment in ANZSIC93 for 1994-95 and 2001-02 and to sum of 23 Transport equipment and 24 Machinery and equipment in ANZSIC06 for 2008-09.

*Source*: Authors’ estimates based on ABS (*Australian National Accounts: Input-Output Tables,* various issues, Cat. no. 5209.0.55.001).

## H.4 Capital lags in Metal products

The strong investment growth in Metal product manufacturing over cycle 4 was also associated with larger projects that took longer to complete. Much of this was due to the size and scale associated with increasing the production of alumina. For example, the Alcan expansion at Gove first appeared as ‘committed’ on the October 2004 ABARE advanced project list, and was not completed until 2007 (ABARE 2004c, 2007).

Capital lags affect multifactor productivity (MFP) growth in periods where there is an acceleration or deceleration in growth of capital inputs. Provided investments are fully utilised over time, such lags have little effect on MFP in the long run.

For the case of Metal products, where the average length between investment and completion was between two and three years[[3]](#footnote-3), the effect of lagging capital inputs is very apparent in the 2003-04 to 2007-08 productivity cycle — the period of strong capital inputs growth (table H.4). With a two-year lag of capital services, annual average MFP growth in that cycle improves by 0.6 of a percentage point but is still negative (‑0.3 per cent); with a three-year lag, MFP improves by 1.8 percentage points and becomes positive (1.0 per cent).

Table H.4 Effect of two- and three-year capital lags on MFP in Metal products

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | MFP growth | | |  | Effect of the lag on MFPa | |
| Cycle | no lags | 2 year lag | 3 year lag |  | 2 year lag | 3 year lag |
|  | % py | % py | % py |  | % pts | % pts |
| 1988-89 to 1993-94 | 1.0 | 0.3 | 0.2 |  | -0.7 | -0.8 |
| 1993-94 to 1998-99 | 1.1 | 1.3 | 0.8 |  | 0.2 | -0.3 |
| 1998-99 to 2003-04 | 1.4 | 2.3 | 2.5 |  | 0.9 | 1.1 |
| 2003-04 to 2007-08 | -0.9 | -0.3 | 1.0 |  | 0.6 | 1.8 |
| 2007-08 to 2010-11b | 0.1 | -1.7 | -2.4 |  | -1.8 | -2.5 |

a Relative to the case with no lags. b Incomplete cycle.

*Source*: Authors’ estimates.

However, in the incomplete cycle 2007-08 to 2010-11, lagging capital inputs worsens rather than improves MFP. With no lags, MFP is positive (though close to zero) but a two- and three-year lag of capital inputs results in average MFP growth rates of ‑1.7 and ‑2.4 per cent a year, respectively.

In effect, adjusting for lags in capital only ‘pushes’ the period of the poor productivity performance to a later period as strong growth of the lagged capital is shifted into the incomplete cycle (which also had poorer output growth relative to cycle 4). The implication is, however, that there may be some underutilised capacity within the Metal products subsector, which could be employed if the operating environment improves.

## H.5 Metal products labour data

There are two sources of ABS data available to investigate employment growth in Metal products and its subdivisions — the *Labour Force Survey* (LFS) and the *Manufacturing Census*/*Economic Activity Survey* (EAS). These two sources indicate roughly similar levels of employment in Metal products in total, although with some difference in trend (figure H.4).

Figure H.4 Employment in Metal products**a**

|  |
| --- |
|  |

a There is a break in series for the Manufacturing Census/EAS data between 2005-06 and 2006-07 due to the change in ANZSIC classifications.

*Data sources*: ABS (unpublished Labour Force Survey data); ABS (*Manufacturing Industry, Australia,* various issues, Cat. no. 8221.0); ABS (*Australian Industry*, various issues, Cat. no. 8155.0).

However, in the Metal products subdivisions, the two different sources of data indicate substantially different levels and trends (figure H.5). In Primary metals, the LFS indicates stronger growth in employment relative to the EAS. In Fabricated metals, the LFS indicates a declining trend in employment, while the EAS indicates growth.

Figure H.5 Employment in Metal products subdivisions**a**

|  |  |
| --- | --- |
| *Primary metals* | *Fabricated metals* |
|  |  |
|  | |

a There is a break in series for the Manufacturing Census/EAS data between 2005-06 and 2006-07 due to the change in ANZSIC classifications.

*Data sources*: ABS (unpublished Labour Force Survey data); ABS (*Manufacturing Industry,* various issues, *Australia,* Cat. no. 8221.0) and ABS (*Australian Industry*, *2010-11*, Cat. no. 8155.0).

A possible source of the discrepancies between the two data sources is that the surveys use different methods of industry identification. In the LFS, the employee indicates their industry of employment, while in the EAS the employer indicates their number of employees. Employer (business) surveys can be a more reliable basis for industry identification (appendix G). The EAS employment data also appear more consistent with output trends in this case. There was strong growth in Fabricated metal product employment over the period of cycle 4, which coincides with the value added growth in Fabricated metals over the same period.

It is possible to disaggregate the growth in employment in Fabricated metals along the same lines as output (box 6.1) in order to try and identify those industry classes responsible for employment growth. This approach is hampered by the unavailability of data at this level of disaggregation after 2006-07 (table H.5).

Table H.5 Estimated contributions to growth in employment in Fabricated metals

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Period 1 (cycle 3): 1998-99 to 2003-04 | |  | Period 2: 2003-04 to 2006-07 | |  | Difference between periods |
|  | *Change in employment* | *Contrib. to growth* |  | *Change in employment* | *Contrib. to growth* |  | *Change in employment* |
|  | number | % pts |  | number | % pts |  | number |
| 2221 Structural steel   fabricating | -3 934 | -0.5 |  | 5 387 | 0.6 |  | 9 321 |
| 2223 Architectural aluminium  product manufacturing | 1 956 | 0.2 |  | 2 033 | 0.2 |  | 77 |
| 2229 Other structural metal   product manufacturing | 1 065 | 0.1 |  | 4 809 | 0.6 |  | 3 744 |
| 2291 Spring and wire product   manufacturing | -773 | -0.1 |  | -368 | 0.0 |  | 405 |
| 2292 Nut, bolt, screw and   rivet manufacturing | 190 | 0.0 |  | 19 | 0.0 |  | -171 |
| 2293 Metal coating and   finishing | 1 577 | 0.2 |  | 947 | 0.1 |  | -630 |
| *Selected classes*a | *81* | *0.0* |  | *12 827* | *1.5* |  | *12 746* |
| *All other fabricated metal prod.* | *8 556* | *1.1* |  | *-3 827* | *-0.5* |  | *-12 383* |
| **22 Fabricated metals** | *8 637* | *1.1* |  | *9 000* | *1.1* |  | *363* |

a Includes the ANZSIC06 classes listed above. These are the classes for which there was no change in definition between ANZSIC93 to ANZSIC06. See box 6.1 for further details.

*Sources*: Authors’ estimates based on ABS (*Australian Manufacturing*, various issues, Cat. no. 8221.0), ABS (*Australian Industry*, various issues, Cat. no. 8155.0) and ABS *(Experimental Estimates for the Manufacturing Industry,* various issues,Cat. no. 8159.0).

The strongest employment growth in the period that overlaps cycle 4 occurred in Structural steel fabricating and Other structural metal product manufacturing, and the strongest employment growth between cycles was in the former. This matches with the trends observed in the nominal value added growth for the subdivision (table 6.4).

1. Deflating disaggregated nominal value added data by using producer prices data for output can only provide a broad approximation of real VA derived from double deflation. Double deflated real VA involves separate deflation of gross output and intermediate inputs using separate price indexes for each. If there are changes in intermediate input prices that are different to those of output prices, then deflating the nominal value added data by output deflators will differ from a double deflated series. [↑](#footnote-ref-1)
2. These data are not available beyond 1996-97. [↑](#footnote-ref-2)
3. The average length of lags is calculated using investment data from the Deloitte Access Economics Investment Monitor (database). [↑](#footnote-ref-3)