# F Additional information on Petroleum, coal, chemical and rubber products

Additional data about the Petroleum, coal, chemical and rubber products (PCCR) subsector (which is chiefly discussed in chapter 4) are presented in this appendix. These additional data include a longer-term view of how the composition of PCCR has changed through time, some trade and assistance data, and more detailed hours worked information.

## F.1 A longer-term view of the composition of PCCR

The composition of the PCCR subsector was discussed in terms of the share that each subdivision comprised of value added, hours worked and investment in 2009‑10. Figure F.1 shows how these shares have changed, over the period covering cycle 3 through to the incomplete cycle, for each of the three PCCR subdivisions: Petroleum and coal product manufacturing (‘Petroleum’), Basic chemical and chemical production manufacturing (‘Chemicals’), and Polymer product and rubber product manufacturing (‘Polymers’).

Disaggregating the PCCR value added (from the ABS National Accounts) is difficult as there is no real measure published for the PCCR subdivisions. Attempts to derive estimates for real value added at the subdivision level by deflating nominal values using producer price indexes (PPIs) yielded measures[[1]](#footnote-1) that are not consistent with the estimates from the National Accounts (table F.1).

Figure F.1 Composition of PCCR — value added, hours worked and investment**a**

Percentage shares

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

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*Data sources*: ABS (unpublished Survey of New Capital Expenditure data); ABS (*Australian Industry,* various issues,Cat.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 no. 8221.0); ABS (unpublished Labour Force Survey data).

Table F.1 Comparison of PCCR output measures and prices

Average annual growth rate (per cent)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Cycle 3 | Cycle 4 | Incomplete cycle |
| **Value added** |  |  |  |
| **PCCR (real)**a | **1.8** | **-0.6** | **-2.3** |
|  |  |  |  |
| Petroleum and coal product mfg (nominal) | 0.5 | 32.9 | -24.9 |
| Basic chemical and chemical product mfg (nominal) | 3.3 | 4.0 | 5.1 |
| Polymer product and rubber product mfg (nominal) | 2.8 | 14.3 | -5.9 |
| *Sum of subdivisions (nominal)* | *2.8* | *11.9* | *-4.3* |
|  |  |  |  |
| Petroleum and coal product mfg (real)b | -12.5 | 10.0 | -21.3 |
| Basic chemical and chemical product mfg (real) | 2.7 | 0.4 | 3.0 |
| Polymer product and rubber product mfg (real) | 1.0 | 9.8 | -7.2 |
| *Sum of subdivisions (real)* | *-2.4* | *0.9* | *-3.6* |
| **Sales and service income**c |  |  |  |
| Petroleum and coal product mfg (nominal) | 9.1 | 7.9 | -5.9 |
| Basic chemical and chemical product mfg (nominal) | 9.8 | 11.7 | 3.8 |
| Polymer product and rubber product mfg (nominal) | 8.8 | 6.3 | -9.0 |
| *Sum of subdivisions (nominal)* | *9.2* | *8.7* | *-3.0* |
|  |  |  |  |
| Petroleum and coal product mfg (real) | -4.9 | -9.8 | -2.0 |
| Basic chemical and chemical product mfg (real) | 9.0 | 7.0 | 0.6 |
| Polymer product and rubber product mfg (real) | 7.0 | 2.6 | -10.3 |
| *Sum of subdivisions (real)* | *1.9* | *-1.7* | *-2.5* |
| **Price deflators** |  |  |  |
| Output PPI: Petroleum and coal product mfg | 14.8 | 20.9 | -4.5 |
| Output PPI: Basic chemical and chemical product mfg | 0.7 | 3.5 | 2.1 |
| Output PPI: Polymer product and rubber product mfg | 1.8 | 4.1 | 1.4 |
| *Output PPI: PCCR*d | *7.7* | *11.6* | *-0.9* |
|  |  |  |  |
| Input PPI: Petroleum and coal product mfg | 11.6 | 21.1 | -1.3 |
| Input PPI: Basic chemical and chemical product mfg | 1.0 | 6.1 | -1.5 |
| Input PPI: Polymer product and rubber product mfg | 1.3 | 6.1 | -0.8 |
| *Input PPI: PCCR*d | *6.2* | *13.0* | *-1.3* |
|  |  |  |  |
| *Sales and service income: PCCR*d | *7.4* | *10.4* | *-0.5* |

a National accounts chain volume measure of PCCR value added b Deflated series using output PPIs. The ‘sum of subdivisions’ series generated by estimating a PPI for PCCR by using subdivision PPIs and current price value added weights. c Sales and service income from ABS *Business Indicators*. The real ‘sum of subdivisions’ series generated by estimating a price deflator for PCCR 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), ABS (*Producer Price Indexes, Australia, December 2012*, Cat no. 6427.0).

The data show the difficulty in trying to reconcile value added growth for the subdivisions with value added growth for the subsector. For example, value added growth for PCCR was 1.8 and -0.6 per cent a year in cycles 3 and 4, respectively; however from the subdivision data deflated using output producer price deflators the growth rates are -2.4 and 0.9 per cent a year for those cycles. One set of data suggests accelerating value added growth, while the other suggests declining.

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 ABS publications based on the *Manufacturing Census* and *Economic Activity Survey*. The subsector data are also based on these sources, together with a range of other information the ABS uses in compiling the National Accounts.[[2]](#footnote-2)

The sales and service income measures are closer to value added growth for PCCR. It is for this reason that the sales and service income measures are used in chapter 4 to help explain what occurred at the subdivision level in terms of output trends.

## F.2 PCCR trade

One of the trends discussed in chapter 4 was the rising volume of imports of chemical and plastic products (table 4.3). Data for imports — available on a Standard International Trade Classification (SITC) basis rather than an Australian and New Zealand Standard Industrial Classification (ANZSIC) basis — showed that the fastest volume growth from cycle 3 to cycle 4 occurred in the ‘Organic chemicals’ and ‘Plastics in non-primary form’ groups.

Within ‘Organic chemicals’, growth was particularly strong in subgroup 515: ‘Organo-inorganic compounds, heterocyclic compounds, nucleic acids and their salts, and sulphonamides’, with import growth rising from -0.8 to 7.4 per cent a year over cycles 3 and 4, respectively.

‘Plastics in non-primary form’ consists of three subgroups in the SITC 3 and 4 classifications — codes 581 to 583. All these subgroups experienced an acceleration of import growth from cycle 3 to 4, with the largest contribution coming from ‘Plates, sheets, film, foil and strip, of plastics’, and the fastest growth occurring in ‘Tubes, pipes and hoses, and fittings therefor, of plastics’. ‘Plates, sheets, film, foil and strip, of plastics’ make up about 80 per cent of imports by value (based on UN 2013 trade data), growth in the import volume of ‘Plates, sheets, film, foil and strip, of plastics’ was approximately 3.9 per cent a year over cycle 3 and accelerated to 7.3 per cent a year over cycle 4. The volume of imports of ‘Tubes, pipes and hoses, and fittings therefor, of plastics’ fell during cycle 3 by approximately 4.4 per cent a year before rising to around 16.1 per cent a year over cycle 4.

#### Effective rates of assistance

The combined value of budget and tariff assistance to both PCCR and Manufacturing, expressed as a share of their value of output, has been constant at around 5 per cent since the mid-1990s (figure F.2). Prior to this, from the early 1980s to the mid-1990s, the effective rate of assistance to PCCR and Manufacturing in total declined — with PCCR starting at a lower level of assistance than Manufacturing.

Figure F.2 Effective rates of assistance, PCCR 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).

## F.3 PCCR hours worked and employment

#### Group-level hours worked data

It is difficult to determine which parts of each subsector are behind the changes in hours worked between cycles 3 and 4. Table F.2 uses additional unpublished ABS data to estimate contributions by the groups in each subdivision (where applicable). However, limitations in the data at this lower level of disaggregation were larger over cycle 4. In particular, there was an increase in the number of hours worked that the ABS was unable to allocate to specific ANZSIC groups within each subdivision (that is, were allocated to ‘not further defined’ categories). Accordingly, the data should be considered as indicative only.

The data indicate that hours worked in PCCR declined in cycle 3 as hours worked in Chemicals and Polymers declined at a rate sufficient to offset the growth in hours worked in the (relatively small) Petroleum subdivision. In cycle 4, however, hours worked growth in Petroleum and Polymers was sufficient to almost exactly offset a decline in hours worked in Chemicals (table F.2). Of interest is the slowing decline in hours worked growth in Chemicals (from cycle 3 to cycle 4) and the reversal of hours worked growth (from a decline to growth) in Polymers.

Table F.2 Contribution of PCCR groups to PCCR subdivision hours worked growth**a**

Percentage points

|  |  |  |  |
| --- | --- | --- | --- |
| ANZSIC subdivision/group | Contribution over cycle 3 | Contribution over cycle 4 | Difference |
| **Petroleum refining** | **3.8** | **1.1** | **-2.7** |
|  |  |  |  |
| **Basic chemical and chemical product manufacturing** | **-1.5** | **-0.7** | **0.8** |
| Basic chemical manufacturing | -1.2 | -0.1 | 1.1 |
| Basic polymer manufacturing | -0.4 | 0.2 | 0.5 |
| Fertiliser and pesticide manufacturing | -0.8 | 0.1 | 0.9 |
| Pharmaceutical and medicinal product manufacturing | 0.6 | -0.5 | -1.1 |
| Cleaning compound and toiletry preparation mfg | 0.2 | -0.7 | -0.9 |
| Other basic chemical product manufacturingb | 0.0 | 0.4 | 0.3 |
|  |  |  |  |
| **Polymer product and rubber product manufacturing** | **-1.4** | **0.5** | **1.9** |
| Polymer product manufacturing | -1.0 | 3.7 | 4.7 |
| Natural rubber product manufacturing | -0.4 | -0.1 | 0.3 |
| Otherb | 0.0 | -3.2 | -3.2 |

a Data for subdivisions were benchmarked against the aggregate for Manufacturing (appendix A). Group level data were then used to apportion these subdivision growth rates. b Includes hours worked allocated to the subdivision, but not further defined to group level.

*Source*: Authors’ estimates based on ABS (unpublished Labour Force Survey data).

* The rate of hours worked decline slowed in the Chemicals subdivision, driven by a strong slowdown in the decline of hours worked in Basic chemical manufacturing and an increase in the number of hours worked in Basic polymer[[3]](#footnote-3) and Fertiliser and Pesticide manufacturing.
* The rate of hours worked went from negative to positive in the Polymers subdivision, with strong growth coming from the Polymer product manufacturing group. Almost all of this growth, however, was offset by a decline in employment from the not further defined category. Given that most of the employment in this subdivision is in Polymer product manufacturing, it is likely that the contribution from the group itself was smaller than shown in table F.2.

1. Deflating disaggregated nominal value added data by using PPIs for output can only provide a broad approximation of real value added derived from double deflation. Double deflated real value added 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. National Accounts estimates are calculated using data from a range of different sources that are then ‘confronted’ using information from the input-output tables. This ensures that the production of each industry is balanced with the use of each industry (ABS 2013b, pp. 544, 564). Accordingly, the National Accounts estimates are considered to be more accurate than those from a single industry survey. [↑](#footnote-ref-2)
3. Contrary to the name of the group ‘Basic polymer manufacturing’ (ANZSIC group 182) is part of the Chemicals subdivision rather than the Polymers subdivision. [↑](#footnote-ref-3)