

## Annex A. Data

### Input-output data

The input-output analysis describes the sale and purchase relationships between producers and consumers within an economy. One key component of input-output data is the intermediate transaction table that records the sales and purchases of intermediate inputs between different sectors of the economy. The intermediate transaction table allows tracing the various inputs that flow into the supply chains (or value chains) of an economy. For instance, how much financial services are purchased by the mining industry, which in turn supplies ores to manufacturing companies.

The input-output data described in Part 1 are compiled by the Australian Bureau of Statistics as part of their national accounts. The most recent compilation for the fiscal year 2014-15, which includes data for 114 industries, is used for the purpose of the analysis included in such section.<sup>1</sup> The ABS defines services-producing industries “as industries other than goods-producing industries”, excluding Agriculture, Forestry and Fishing; Mining; Manufacturing and Construction. The latter differ from the convention used by the OECD that classifies Construction as a services sector. To facilitate international comparisons of trade statistics, the OECD convention is adopted in the remaining of the analysis.<sup>2</sup> The input-output tables identifies 50 service headings (4-digit codes), including construction services, divided into 15 divisions reported in Table A.1. As highlighted in Table A.1, there is a slight difference in sector codes used in Australia New Zealand Standard Industrial Classification (ANZSIC) 2006 and ISIC, Rev 3.1.

Data and analytical results reported in the main text refer to the main services divisions. Results at the 4-digit headings levels are available in Annex C.

Gross output (production) and gross export shares can be extrapolated directly from the input-output tables. Gross output is a measure of an industry's sales or receipts, which include sales to final users in the economy and to other industries as intermediate inputs.<sup>3</sup> Gross export is the gross value of the export sales.<sup>4</sup> The value added produced by each industry is calculated either as (i) the gross output minus the costs of intermediate inputs, or as (ii) the compensation to the primary production factors employed by the industry (capital and labour). In other words, measures in value added terms express the value created by the industry by processing inputs into more valuable outputs, where the difference is used to compensate the employees and the owners of the firms that provide capital and carry risks. The contribution to GDP is measured by the value added net of taxes and subsidies. The total export of value added of a sector is calculate as the sum of the direct value added export of the sector and the value added that is transmitted through the supply chains of the economy to other industries that export to the world market.

The direct export of value added can be derived from input-output tables by multiplying the value added coefficient, i.e. value added divided by gross output, by the gross exports of the sector. The indirect export of value added requires a more advanced calculation that traces the value added flows between all sectors of the economy to the final export point (see

Annex B for technical details). The export propensity of each sector, both in gross and value added terms, is defined as the shares of output and value added, respectively, that are exported (Table C.3).

**Table A.1. Input-Output sector definition and classifications**

| Sector   | ANZSIC, 2006 | 3.1 |
|--|--------------|-----|
| <b>Goods</b>   |              |     |
| Agriculture, Forestry and Fishing                        | A            | A   |
| Mining   | B            | B   |
| Manufacturing  | C            | C   |
| <b>Services</b>  |              |     |
| Electricity, Gas, Water and Waste Services               | D            | D-E |
| Construction   | E            | F   |
| Wholesale Trade and Retail                               | F-G          | G   |
| Accommodation and Food Services                          | H            | I   |
| Transport, Postal and Warehousing                        | I            | H   |
| Information and Communication                            | J            | J   |
| Financial and Insurance Services                         | K            | K   |
| Real Estate Activities                                   | L            | L   |
| Professional, Scientific and Technical Activities        | M            | M   |
| Administrative and Support Services Activities           | N            | N   |
| Public administration and defence; comp. social security | O            | O   |
| Education  | P            | P   |
| Human health and social work activities                  | Q            | Q   |
| Arts and Recreation Services                             | R            | R   |
| Other Services   | S            | S   |

### Shift-share analysis

Shift-Share Analysis is quite demanding on data. The first constraint is the sector and geographical breakdown of Australia's own trade statistics. Exports statistics for narrowly defined service categories is not broken down by partner country. Bilateral trade statistics by sector and market only exist for the main divisions in EBOPS 2010.<sup>5</sup> What is more, bilateral data is only reported for 34 trading partners. The second data constraint is the availability of matching trade statistics from other countries. Many countries are lagging behind in the migration from EBOPS 2002 (IMF BPM 5) to EBOPS 2010 (IMF BPM 6). And when data exists in EBOPS 2010, the time series usually starts first 2010.

The most appropriate solution to this problem is to match Australia's export statistics with the import statistics of its trading partners at the main division of EBOPS 2010. The latter data does not have to be broken down geographically; total imports from the world are sufficient to calculate the benchmark indicators. This match is possible for 31 of the 34 partner countries that are identified in Australia's trade statistics, the missing countries being Brunei Darussalam, Chinese Taipei and Viet Nam. The analysis covers eleven services sectors: The included services are (SC) Transport, (SDA) Business Travel, (SDB2) Educational-related personal travel, (SDB, other) Other Personal Travel, (SE) Construction, (SF) Insurance and pension services, (SG) Financial services, (SH) Charges for the use of intellectual property n.i.e., (SI) Telecommunications, computer, and information services, (SJ) Other business services, and (SK) Personal, cultural, and recreational services.

Three sectors have to be dropped because of insufficient geographic breakdown of the data either for Australia and/or the partner countries (manufacturing services on physical inputs

owned by others, maintenance and repair services n.i.e., government services). Global imports of travel services divided between (a) Business travel, (b) educational-related personal travel and (c) other personal travel (tourism and health-related travel) are only available for 21 out of 31 countries. When missing, these categories are estimated using the reported export share of EU28 to the non-reporting countries (multiplied with the reported total imports of travel service).

The data included in the shift-share analysis represents about 78% of Australia's export in 2014. The time period for the shift-share analysis is relatively short, covering the four-year period 2010 to 2014 (to be extended to 2015 when data permits).

## Firm-level data analysis

Firm-level data on services trade and investment are drawn from the Survey of International Trade in Services (SITS) and from the Survey of International Investment (SII), along with numerous administrative and modelled data, carried out by the Australian Bureau of Statistics (ABS) for the compilation of the Australian Balance of Payments statistics and the Australian International Investment Position.

SITS is a statutory survey conducted on a quarterly basis, and addressed to Australian resident enterprises, that engage in (or are likely to in the near future) services traded internationally. Firms engaged in international services transactions are identified through the International Trade in Services Coverage Survey, and subsequently allocated a SITS object classification for form type and stratification purposes. The types of traded services reported are defined according to an Australian internal services trade classification, somewhat equivalent to the Extended Balance of Payments Services (EBOPS, 2010), from which it is possible to match thirteen STRI sectors.<sup>6</sup> The sample selected for the micro-data analysis comprises about 1 747 exporting firms over a period of three years, from 2014 to 2016.

Data on foreign investment are based on information provided by Australian corporations and Australian branches of foreign corporations about their financial claims and liabilities to non-residents. An Australian enterprise group consists of an Australian parent enterprise (the top Australian enterprise), its Australian branches and its Australian subsidiaries as defined by the Corporations Law. The survey form is completed by the top Australian enterprise for a single institutional sub-sector.

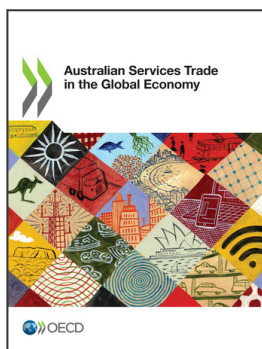
The ABS considers as foreign direct investment in Australia, non-residents direct investors that hold 10% or more of the ordinary shares or voting stock of any Australian enterprise. Similarly, Australian direct investment abroad includes investments overseas by Australian entities (individuals or businesses) that hold 10% or more ownership in a foreign business.<sup>7</sup> The target population of the survey is comprised of all Australian enterprise groups that have foreign investment based on information available on the Business Register managed within the ABS. FDI data are classified by Industry according to the principal activity of the Australian parent or the Australian subsidiary, following the ANZSIC, 2006, 1292.0. From this industry classification, eleven STRI sectors are matched (as reported in Table A.2), for a total of 117 Australian parent companies with control in overseas affiliated companies present in 1 129 countries, over the period 2012-2016.

**Table A.2. Correspondence between STRI sectors and national classifications**

| STRI sectors               | Foreign direct investment data   |  |
|----------------------------|--|--|
|                            | ANZIC 2006   |  |
| Audio-visual services (AS) | 5511, 5512, 5513, 5610, 5621, 5700   |  |
| Commercial Banking (FSbnk) | 6221, 6223, 6229, 6230   |  |
| Computer (CS)              | 5910, 7000   |  |
| Construction (CO)          | 3011, 3019, 3020, 3101, 3109, 3211, 3224, 3232, 3234, 3239   |  |
| Distribution (DS)          | 3312, 3319, 3321, 3322, 3323, 3339, 3411, 3419, 3491, 3492, 3493, 3494, 3499, 3601, 3606, 3609, 3712, 3720, 3731, 3736, 3739, 3921, 3922, 4110, 4211, 4221, 4222, 4251, 4259, 4260 |  |
| Engineering (PSeng)        | 6923   |  |
| Insurance (FSins)          | 6310, 6321, 6322, 6411, 6419   |  |
| Legal (PSleg)              | 6931   |  |
| Logistics (LS)             | 5292, 5299, 5301, 5309   |  |
| Telecommunications (TC)    | 5801, 5802   |  |
| Transport (TR)             | 4610, 4710, 4810, 4900, 5211, 5212, 5219   |  |

## Notes

1. A fiscal year (or financial year) is the period used by governments for accounting and budget purposes, which in Australia runs from 1 July to 30 June the following year.
2. This inevitably means that some aggregate statistics published in this paper will deviate from ABS statistics on the same subject.
3. Australian IO-tables distinguish seven categories of final uses: Final Consumption Expenditure, divided between (Q1) Households and (Q2) Government; Gross Fixed Capital Formation, divided between (Q3) Private, (Q4) Public Enterprise and (Q5) General Government; (Q6) Changes in Inventories; and (Q7) Exports.
4. The services export component of the input-output analysis is based on data sourced from the Balance of Payments, which covers all modes of supply except commercial presence abroad.
5. A notable exception are travel services (the largest category), which are broken down into business and personal travel divided further into educational-related and other personal travel (tourism and health-related travel).
6. The STRI sectors matched are: audio-visual services (motion pictures and sound recording); construction; commercial banking; computer services; professional services (accounting/auditing, architecture, engineering, legal services); telecommunication; postal and courier services; air and maritime transport.
7. Direct investment can take the form of *branches*, if fully owned by the direct investor; *subsidiaries*, if at least 50% is owned by the direct investor; and *associated companies*, if between 10% and 50% of ownership is in the hand of the direct investor.



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