Sources and methods Australia

The Australian statistical system uses the ANZSIC scheme to classify industries. This system is similar to NACE rev. 1, but a detailed concordance is necessary nonetheless. Furthermore, most data cover the Australian fiscal year, which runs from July to June. Following OECD convention, data are allocated to the starting calendar year, so data covering the period June 1995 to July 1996 are allocated to 1995. For reference, catalogue numbers used by the Australian Bureau of Statistics (ABS) are given in parentheses when a data source is publicly available there.

WP1: Inter-industry Accounts

Current prices - sources

The Australian National Accounts (ANA, 5204.0) provides data on value added and its components, compensation of employees, gross operating surplus and net taxes on production (Tables 11, 59 and 57). For this data file, we use the 2006-07 release, covering data on these variables at the divisional level of industry detail (18 industries[1]) for the period 1989-2005. For value added, we complement this with comparable series from the 1993-94 ANA for the period 1982-1989. For earlier years, we use ANA 1985-86 (1974-1977) and ANA 1989-90 (1978-1981), but these are classified according to the older ASIC classification system.

The main additional source of data are the annual and benchmark Supply and Use Tables (SUTs). From 1994 onwards, the ABS estimates annual SUTs, of which we obtained the (confidentialised) set underlying the 2005-06 ANA release. Since 1968, the ABS has periodically published benchmark SUTs. The Productivity Commission subsequently reclassified these to a common industry classification, namely the set of industries underlying the 1996-97 benchmark SUT and we use this set of tables. In addition to the income components, the annual and benchmark SUTs also provide information on gross output by industry and a breakdown in intermediate inputs into energy, materials and services products. The annual SUTs provide data on 53 industries,

[1] Including the value of imputed rents from the ownership of dwellings.

while the benchmark SUTs give data on 106 industries and both SUTs contain data on value added and its components.

We also employ data from a number of industry datasets. From 1998 onwards, the ABS runs the Economic Activity Survey, the results of which are published in Australian Industry (8155). This source provides data at a detailed industry level on total sales. For some recent years, there are also labour compensation and value added estimates, but to enhance comparability, we use the sales data. For manufacturing, we use data on value added and labour compensation from the Manufacturing Industry (8221) publication. From 1989 onwards, this source provides data according to the ANZSIC classification. For earlier years, back to 1968, we use the Productivity Commission's manufacturing database, which is based on earlier manufacturing surveys and classified according to the 3-digit ANZSIC system.

This combination of sources allows for most detailed EU KLEMS industries to be distinguished.[2] One exception is trade, where EU KLEMS distinguishes trade in motor vehicles and fuel from other wholesale and other retail trade. The Economic Activity Survey allows for such a distinction from 1998 onwards, but for earlier years, publications for wholesale trade (8638.0) and retail trade (8622.0) are used. For some of the detailed business services industries, again before 1998, we supplement the SUT data with the product details underlying the benchmark SUTs (5215.0).

Current prices - methods

To serve as a benchmark, we first estimate a time series of industry value added at the ANZSIC divisional level for the 1970-2005 period. For the 1989-2005 period, this data is available from the ANA. For earlier years, we first estimate total gross value added at basic prices as for the 1970-1988 period, only gross value added at market prices and total factor income are available from the ANA. The first concept covers net taxes on both products and production, while the second concept includes no taxes. Overall net taxes therefore need to be split up into net taxes on products, which are not included in value added at basic prices, and net taxes on production, which are included. Table 40 of the ANA shows a time series of 'Taxes on production and imports'. For the 1989-2005

[2] See the concordance table at the end of this documentation for details.

period, net taxes on production account for about 68 percent of 'Taxes on production and imports' and we apply this rate to all earlier years to estimate total value added at basic prices. The residual of net taxes on products stay positive for the entire period, suggesting that this estimation method leads to a usable time series of aggregate value added at basic prices. To estimate value added at the divisional level before 1989, we use the older ANA releases, in combination with benchmark SUTs for the pre-1982 period.

As further benchmarks, we estimate the components of value added, labour compensation, gross operating surplus and net taxes on production. These components are again directly available from 1989 onwards. For earlier years, only the series for the total economy are available. For the industries we use the trend from the (interpolated) benchmark SUTs as initial estimates. However, doing this for all three components will mean that the components no longer add up to value added. To enforce that the components add up across industries to the total economy number and across components to industry value added, we use a RAS procedure.[3]

These benchmark series provide the foundation from which we estimate our detailed EU KLEMS industries. If an industry is not available in the ANA, we use the annual or benchmark SUTs. Beyond that, we rely on the Economic Activity Survey, the manufacturing material and the specific material for trade and business services. For gross output and intermediate inputs at current prices, the annual SUTs provide the only consistent time series, but only from 1994 onwards. For earlier years, we use interpolated benchmark SUTs and manufacturing, trade and business services source material. The proportion of energy, materials and services inputs are also estimated using annual and (interpolated) benchmark SUTs for the 30 growth accounting industries

Volumes

From 1994 onwards, gross output and intermediate inputs are separately deflated, leading to double-deflated value added. For the 54 industries in the annual SUTs, gross output and value added price indices are used. For more detailed manufacturing industries, producer price indices (PPIs) are the main source of additional data. The PPIs are

[3] Starting from initial estimates, the sum across one dimension is first constrained to add up to the control total. This procedure is then applied across the other dimension. These two steps are repeated until the elements no longer change and the summation across both dimensions is equal to the control totals.

adjusted so that the aggregate over the more detailed industries equals the control total from the annual SUTs, for both gross output and value added. In case no PPIs are available, the price index from the more aggregate industry is used directly. For motor trade (NACE50), the price index for retail trade is used, just as for retail trade, excluding motor vehicles (NACE52). For wholesale trade, excluding motor vehicles (NACE51), the total wholesale trade price index is used since motor trade mostly consists of retail motor trade. Business services PPIs are available from 1999 onwards and the same procedure is followed as for manufacturing industries.

For the 1974-1993 period, the ANA provide data on value added at constant prices for 32 industries and imputed housing services. (The exception are the nine manufacturing, where the ANA cover only the period from 1977 onwards.) The value added volumes for this period are derived using single deflation, so the implicit price deflators for value added are also used for gross output. PPIs are used again for detailed manufacturing industries, with the same adjustment procedure to ensure that the detailed aggregate to the ANA control totals. Before 1974, the United Nations National Accounts database provides data on value added at constant prices for seven industries and these output trends are applied at the industry level, except in manufacturing where PPIs are used directly for the 1970-1976 period. The aggregate across industries matches the trend in GDP at constant prices closely. The ABS balances the annual SUT volumes only for overall intermediate inputs, not for individual commodities, so we do not estimate volumes of energy, materials and services intermediates.

WP2: Labour accounts

Employment and hours by industry

From 1984 onwards, the Labour Force Survey (LFS, 6291) provides data on employees, total persons employed and the corresponding number of hours worked for nearly all EU KLEMS industries. For more detailed manufacturing industries, we use manufacturing survey data. Before 1984, we use the manufacturing data compiled by the Productivity Commission to extrapolate the LFS numbers. For non-manufacturing industries before 1984, we use the trend of the number of persons employed from the Labour Force historical time series (6204).

Labour composition

The main source of data is from the LIS,[4] which in turn is based on the Survey of Income and Housing Costs of the ABS. This sources provides data on total hours worked and the average wage in 7 industries by sex, age and education. Between the survey years, we linearly interpolate. In addition, before 1989 and after 2003 we use data from the ABS underlying their experimental market sector labour composition index. Mapping their labour categories into those used in EU KLEMS, we extrapolate the hours worked and wage of each type of worker in all industries using the market sector trend of that type of worker. Finally, consistency with the remainder of the database is enforced by ensuring that total hours worked in each industry in each year sum to total hours worked from the LFS and that labour compensation (hours worked times the wage rate) sums to industry labour compensation in each year.

WP3: Capital accounts

The main source of investment in current and constant prices by industry and asset is the ANA. These provide data at the ANZSIC divisional level of industry detail for twelve assets from 1959 onwards. These map into the EU KLEMS asset classification except for communications equipment. Communications equipment by industry is included with other electrical and electronic equipment. We distinguish communications equipment by first estimating investment at the total economy level using annual SUTs from 1994 onwards. Before 1994, the benchmark SUTs show unrealistically erratic shares of communication equipment investment in electrical and electronic equipment, so we use the average share for the 1994-2004 period from the annual SUTs for the earlier years. As the price index, we use price index of investment in electrical and electronic equipment by the telecommunications industry from the ANA as this industry mostly invests in communication equipment. To distribute communication equipment by industry, we assume the telecommunications industry buys no other electrical and electronic

[4] Luxembourg Income Study (LIS) Micro database, (1989, 1995, 2001, 2003); harmonization of original surveys conducted by the Luxembourg Income Study, Asbl. Luxembourg, periodic updating.

equipment.[5] For the other industries, we assume the same share of communications equipment to electrical and electronic equipment so that communications equipment investment adds up to the estimated aggregate.

For the 13 detailed manufacturing industries we separately distinguish investment in machinery and equipment, buildings and intangible investment like software. For the most recent years, the Economic Activity Survey provides these data, while for earlier years, we use data from manufacturing surveys, partly based on compilations by the Productivity Commission and partly based on OECD compilations. The breakdown of total industry investment into buildings and machinery and equipment is available from 1970 onwards and held constant before then. Information about software investment is available from 1996 onwards and held constant before then. Since the ANA data provide the control total for total manufacturing, these shares are used to divide manufacturing investment amongst the detailed industries. We use the software share to proxy for all ICT investment, the machinery and equipment share for transport and other non-ICT equipment and the buildings share for non-residential structures investment. A RAS procedure is used to ensure that investment across assets and industries adds up to the control totals.

In addition to distinguishing investment in manufacturing industries, motor trade (NACE50) and real estate (NACE70) investment also need to be estimated. To estimate investment by the motor trade industry, value added shares are used to take out investment from wholesale trade and retail trade. To distinguish real estate from property and business services, we use the investment share to take out investment in non-residential structures and the value added share for other assets.[6] The investment share is of the real estate industry is much higher at around 50 percent compared to a 23 percent value added share and this is most likely caused by the large investment in (non-residential) buildings by the real estate industry.

As the investment data are only available from 1959 onwards, a set of initial stocks is needed to estimate reliable capital stocks from 1970 onwards. We use the initial stocks

[5] The ICT Satellite Account prepared by the ABS (5259.0) also provides such a breakdown for 2002-03, but this includes investment in accompanying structures. Applying this information to electrical and electronic equipment is therefore inappropriate and also led to estimates of negative investment.

[6] Note that this is the value added share excluding imputed rents from owner-occupied housing.

in 1959 from the ANA, using investment shares in that year to distinguish communication equipment and the additional industries in manufacturing and services.

Concordance Table, EU KLEMS – ANZSIC

EUK	Description	ANZSIC
TOT	**TOTAL ECONOMY**	A-Q
AtB	**AGRICULTURE, HUNTING, FORESTRY AND FISHING**	A
A	…AGRICULTURE, HUNTING AND FORESTRY	01-03
1	……Agriculture	01+02
2	……Forestry	03
B	…FISHING	04
C	**MINING AND QUARRYING**	B
10t12	…MINING AND QUARRYING OF ENERGY PRODUCING MATERIALS	11-12
10	……Mining of coal and lignite; extraction of peat	11
11	……Extraction of crude petroleum and natural gas and services	12
12	……Mining of uranium and thorium ores	n.a.
13t14	…MINING AND QUARRYING EXCEPT ENERGY PRODUCING MATERIALS	13-15
13	……Mining of metal ores	13
14	……Other mining and quarrying	14+15
D	**TOTAL MANUFACTURING**	21-29
15t16	…FOOD PRODUCTS, BEVERAGES AND TOBACCO	21
15	……Food products and beverages	211-218
16	……Tobacco products	219
17t19	…TEXTILES, TEXTILE PRODUCTS, LEATHER AND FOOTWEAR	22
17t18	……Textiles and textile products	22ex225+2262
17	……*Textiles*	221-223
18	……*Wearing Apparel, Dressing And Dying Of Fur*	224+2261
19	……Leather, leather products and footwear	225+2262
20	…WOOD AND PRODUCTS OF WOOD AND CORK	231+232+2919
21t22	…PULP, PAPER, PAPER PRODUCTS, PRINTING AND PUBLISHING	233+24
21	……Pulp, paper and paper products	233
22	……Printing, publishing and reproduction	24
221	……*Publishing*	242
22x	……*Printing and reproduction*	241+243
23t24	…CHEMICAL, RUBBER, PLASTICS AND FUEL PRODUCTS	25
23	……Coke, refined petroleum products and nuclear fuel	251+252
24	……Chemicals and chemical products	253+254
244	……*Pharmaceuticals*	2543
24x	……*Chemicals excluding pharmaceuticals*	253+254ex2543
25	……Rubber and plastics products	255+256
26	…OTHER NON-METALLIC MINERAL PRODUCTS	26
27t28	…BASIC METALS AND FABRICATED METAL PRODUCTS	27+2911
27	……Basic metals	271-273
28	……Fabricated metal products	274-276+2911
29	…MACHINERY, NEC	2851+286
30t33	…ELECTRICAL AND OPTICAL EQUIPMENT	283-285ex2851
30	……Office, accounting and computing machinery	2841
31t32	……Electrical engineering	2842+2849+2852-2859
31	……*Electrical machinery and apparatus, nec*	2852-2859
313	…… *Insulated wire*	2852
31x	…… *Other electrical machinery and apparatus nec*	2853+2854+2859
32	……*Radio, television and communication equipment*	2842+2849
321	…… *Electronic valves and tubes*	2849
322	…… *Telecommunication equipment*	2842
323	…… *Radio and television receivers*	n.a.
33	……Medical, precision and optical instruments	283
331t3	…… *Scientific instruments*	2832+2839
334t5	…… *Other instruments*	2831
34t35	…TRANSPORT EQUIPMENT	281+282
34	……Motor vehicles, trailers and semi-trailers	281

Concordance Table, EU KLEMS – ANZSIC, continued

EUK	Description	ANZSIC
35	……Other transport equipment	282
351	……*Building and repairing of ships and boats*	2821+2822
353	……*Aircraft and spacecraft*	2824
35x	……*Railroad equipment and transport equipment nec*	2823+2829
36t37	…MANUFACTURING NEC; RECYCLING	292+294
36	……Manufacturing nec	292+294
37	……Recycling	n.a.
E	**ELECTRICITY, GAS AND WATER SUPPLY**	D
40	…ELECTRICITY AND GAS	36
40x	……Electricity supply	361
402	……Gas supply	362
41	…WATER SUPPLY	37
F	**CONSTRUCTION**	E
G	**WHOLESALE AND RETAIL TRADE; RESTAURANTS AND HOTELS**	F+G+H
50t52	…WHOLESALE AND RETAIL TRADE; REPAIRS	F+G
50	……Sale, maintenance and repair of motor vehicles and motorcycles; retail sale of fuel	462+53
51	……Wholesale trade and commission trade, except of motor vehicles and motorcycles	45-47ex462
52	……Retail trade, except of motor vehicles and motorcycles; repair of household goods	51+52
H	…HOTELS AND RESTAURANTS	H
I	**TRANSPORT AND STORAGE AND COMMUNICATION**	I+J
60t63	…TRANSPORT AND STORAGE	I
60	……Inland transport	60+62+65
61	……Water transport	61
62	……Air transport	62
63	……Supporting and auxiliary transport activities; activities of travel agencies	66+67
64	…POST AND TELECOMMUNICATIONS	J
JtK	**FINANCE, INSURANCE, REAL ESTATE AND BUSINESS SERVICES**	K+L
J	…FINANCIAL INTERMEDIATION	K
65	……Financial intermediation, except insurance and pension funding	73
66	……Insurance and pension funding, except compulsory social security	74
67	……Activities related to financial intermediation	75
K	…REAL ESTATE, RENTING AND BUSINESS ACTIVITIES	L
70	……Real estate activities	771+772
71t74	……Renting of m&eq and other business activities	773+774+78
71	……*Renting of machinery and equipment*	773+774
72	……*Computer and related activities*	783
73	……*Research and development*	781
74	……*Other business activities*	782+784+785+786
741t4	…… *Legal, technical and advertising*	782+784+785
745t8	…… *Other business activities, nec*	786
LtQ	**COMMUNITY SOCIAL AND PERSONAL SERVICES**	M-Q
L	…PUBLIC ADMIN AND DEFENCE; COMPULSORY SOCIAL SECURITY	M+9631-9633
M	…EDUCATION	N
N	…HEALTH AND SOCIAL WORK	O
O	…OTHER COMMUNITY, SOCIAL AND PERSONAL SERVICES	P+Q
90	……Sewage and refuse disposal, sanitation and similar activities	9634
91	……Activities of membership organizations nec	961+962
92	……Recreational, cultural and sporting activities	91-93
921t2	……*Media activities*	91+924
923t7	……*Other recreational activites*	92ex924+93
93	……Other service activities	95
P	…PRIVATE HOUSEHOLDS WITH EMPLOYED PERSONS	97
Q	…EXTRA-TERRITORIAL ORGANIZATIONS AND BODIES	n.a.