

---

# A Data sources for investment in intangibles

This appendix describes the Australian data sources used in this study and presents the capital series estimates. While the intent has been to follow the Corrado, Hulten and Sichel (CHS) methodology used in the studies of the United States (CHS 2005, CHS 2006), the United Kingdom (Marrano and Haskel 2006, Marrano, Haskel and Wallis 2007) and Japan (Fukao et al. 2008b), to allow comparability, data availability has led to some differences. A discussion of how the data sources compare with those used in the other studies is included.<sup>1</sup>

The estimates of intangibles have been constructed for the market sector (the industries that make up the market sector are listed in table A.1). All references to ABS ANZSIC (Australian Bureau of Statistics Australian and New Zealand Standard Industrial Classification) are to the ANZSIC 1993 edition. The closest available ASIC (Australian Standard Industrial Classification) industry division/subdivision has been used for early years in the absence of sufficient data to use a more precise concordance.

**Table A.1 Industries included in the market sector<sup>a</sup>**

---

Agriculture, forestry & fishing	Retail trade
Mining	Accommodation, cafes & restaurants
Manufacturing	Transport & storage
Electricity, gas & water	Communication services
Construction	Finance & insurance
Wholesale trade	Cultural & recreational services

---

<sup>a</sup> The industries excluded are Property & business services, Government administration & defence, Education, Health & community services, and Personal & other services.

---

<sup>1</sup> The Corrado, Hulten and Sichel methodology (CHS 2006) has also been used to measure intangibles for Finland (Jalava, Aulin-Ahmavaara and Alanen 2007), the Netherlands (RBT 2008, van Rooijen-Horsten et al. 2008), France, Germany, Italy and Spain (Hao, Manole and van Ark 2008) and Canada (Belhocine 2008). Any major measurement differences in these studies are noted in table A.3 and the international comparisons in chapter 6.

---

Table A.2 summarises the measures, data sources, deflators and depreciation rates used to construct the Australian capital stock for each of the intangibles. The following sections explain these factors, and the rationale for them, in more detail. Table A.3 at the end of the chapter compares data sources across studies.

## A.1 Expenditure on computerised information

As noted above, computer software is already capitalised into the national accounts by the ABS and these data are used in this paper.

The ABS defines computer software as:

... computer programs, program descriptions and supporting materials for both systems and applications software. Included are purchased software, and, if the expenditure is large, software developed on own-account. Large expenditure on the purchase, development or extension of computer databases that are expected to be used for more than one year, whether marketed or not, are also included. (ABS 2000, p. 452)

CHS (2006) identify computer software and computerised databases separately — taking the computer software data and own account computer databases data from the US National Income and Product Accounts. The purchased component of computer databases is estimated from US Services Annual Survey (based on subscription revenue from database and directory publishing industry).<sup>2</sup>

The ABS measure appears broadly similar to the combined CHS measures. However, the ABS measure may understate this intangible through the exclusion of some database and own-account software development.

It should be noted that the asset lives used for computer software differ across countries. For example, the average depreciation rate is 20 per cent in the Australian national accounts compared with 40 per cent in the United Kingdom. In the US study, CHS (2006) use 33 per cent and this is followed by in the Japanese study.

---

<sup>2</sup> This was around 2 per cent of software included in the US National Income and Product Accounts in 1998–2000 (CHS 2005, table 3).

**Table A.2 Summary of data sources and assumptions used to construct stocks of intangibles**

<i>Type of intangible</i>	<i>Main data source</i>	<i>Time series (all refer to financial year ended)</i>	<i>Proportion of expenditure considered as investment</i>	<i>Deflator</i>	<i>Dep'n rate</i>	<i>Investment 2006 (\$m)</i>	<i>Stock 2006 (\$m)</i>
Computerised information	ABS national accounts (5204.0)	2006-1975 Gross fixed capital formation (GFCF) and productive capital stock (PKS) for computer software by market sector industries	1	ABS computer software implicit price deflator (IPD)	0.2	7 435	22 619
Business expenditure on R&D	ABS BERD survey (8104.0)	2006-1975 Business expenditure on R&D by market sector industries (excluding R&D by the financial services industry)	1	Implied market sector gross value added (GVA) deflator	0.2	7 904	29 490
Mineral exploration	ABS national accounts (5204.0)	2006-1975 GFCF and PKS for mineral exploration	1	ABS mineral exploration IPD	0.1	2 503	31 737
Artistic originals	ABS national accounts (5204.0)	2006-1975 GFCF and PKS for artistic originals	1	ABS artistic originals IPD	0.6	698	1 102

(continued on next page)

Table A.2 (continued)

Type of intangible	Main data source	Time series	Proportion of expenditure considered as investment	Deflator	Dep'n rate	Investment 2006 (\$m)	Stock 2006 (\$m)
New product development in financial industry	ABS IO/SU tables (5215.0/unpublished)	2006-2005 Forecast at 2004 growth rate	1	Implied Finance & insurance industry GVA deflator	0.2	5 591	27 507
		2004-1995 20 per cent of intermediate purchases of SUIC 380 Finance and Finance share of SUIC 400 Services to finance, investment & insurance					
New architectural and engineering designs	ABS Industry survey (8155.0)	1994-1975 Backcast using growth rate in intermediate usage of Financial & insurance					
		2006 Forecast at 2005 growth rate	1	Implied market sector GVA deflator	0.2	4 650	18 405
		2005-1999 Half of sales of architectural and consulting engineering services (ANZSIC 7821, 7823).					
		1998-1995 Backcast using growth in Architectural, surveying, consulting engineering and quantity surveying services SUPC 43020. Assumes growth for broader group is same as for ANZSIC 7821-7823.					
		1994-1975 Backcast using growth rate in Architectural services, surveying and consulting engineering in IO product tables. Assumes growth for broader group is same as ANZSIC 7821-23.					
		All scaled to market sector using market sector intermediate usage as a share of Australian production of SUPC 43020 from SU tables back to 1994-95 (backcast using market sector share of GVA).					

Advertising	CEASA (2003, 2006, 2007)	2006-1975 Total advertising expenditure less expenditure on classifieds and directories. Multiplied by 2 to arrive at estimate including production costs. Scaled to market sector using market sector intermediate usage as a share of Australian production of advertising services (SUPC 43025 from SU tables back to 1994-95, backcast using market sector share of GVA)	0.6	Implied market sector GVA deflator	0.6	7 337	12 160
Market research	ABS Industry surveys (8155.0, 8677.0)	2006 Forecast at 2005 growth rate 2005-1993 Twice sales of market research services (ANZSIC 7853), to impute own account market research. 1992-1975 Backcast using growth rate in Market and business services from IO product tables. Assumes growth rate for this broader group is same as for ANZSIC 7853. Scaled to market sector using market sector intermediate usage as a share of Australian production of Other business services SUPC 43031 from SU tables back to 1994-95 (assumes this share is the same for market research services) (backcast using market sector share of GVA).	0.6	Implied market sector GVA deflator	0.6	1 107	1 707

(continued on next page)

Table A.2 (continued)

Type of intangible	Main data source	Time series	Proportion of expenditure considered as investment	Deflator	Dep'n rate	Investment 2006 (\$m)	Stock 2006 (\$m)
Firm-specific human capital	ABS Training surveys (6353.0, 6278.0)	Market sector excluding Agriculture Survey data for training costs (including wages of employees being training) for 2002, 1997, 1994, 1991.  Estimates (in real terms) for other years derived from estimated total hours of training and estimated real costs per training hour  Total hours of training based on growth in employee numbers and; for years between survey observations (1990, 1991, 1994, 1997, 2001, 2005) an assumed linear growth in hours per employee; or for 1975-89 assumed hours per employee at 1990 levels and for 2006 at 2005 levels.  Linear interpolation used to estimated real costs per hour between survey data (2002, 1997, 1994, 1991) and exponential trend growth used for 1975-1990 and 2003-2006.	1	Average weekly full-time ordinary earnings deflator	0.4	4 353	10 429

Purchased organisational capital	ABS Industry survey (8155.0)	2006 Forecast at 2005 growth rate	0.8	Implied market sector GVA deflator	0.4	10 208	22 650
		2005-1999 Sales of business management services (ANZSIC 7855).					
		1998-1995 Backcast using growth rate in Other business services SUPC 43031. Assumes growth rate for this broader group is same as for ANZSIC 7855.					
		1994-1975 Backcast using growth rate in Market and business services from IO product tables. Assumes growth rate for this broader group is same as for ANZSIC 7855.					
		All scaled to market sector using market sector intermediate usage as a share of Australian production of Other business services SUPC 43031 from SU tables back to 1994-95 (assumes this share is the same for business management services) (backcast using market sector share of GVA).					

(continued on next page)

Table A.2 (continued)

<i>Type of intangible</i>	<i>Main data source</i>	<i>Time series</i>	<i>Proportion of expenditure considered as investment</i>	<i>Deflator</i>	<i>Dep'n rate</i>	<i>Investment 2006 (\$m)</i>	<i>Stock 2006 (\$m)</i>
Own account organisational capital	ABS Labour survey (6310.0)	2006-1998 20 per cent of earnings of market sector employees classified as Managers & administrators (excluding farm managers and IT managers). 1997-1989 Earnings backcast using growth rate in earnings of employees classified as Managers & administrators for the total economy. Assumes market sector growth rate is the same as for the total economy Employee numbers backcast using growth in total employed Managers & administrators for market sector less Agriculture. 1988-1975 Earnings backcast using growth rate in earnings of full-time employees classified as Administrative, executive and managerial employees for the total economy. Assumes market sector growth rate is the same as for full-time Managers & administrators employees for the total economy. Employee numbers backcast using growth in total employed in Administrative, executive and managerial occupations for approximated market sector less Agriculture.	1	Implied market sector GVA deflator	0.4	4 938	11 086

---

## A.2 Expenditure on innovative property

CHS (2005) include six types of innovative property — scientific R&D, mineral exploration, copyright and licence costs, new product development costs in the financial industry, new architectural and engineering designs, and R&D in social sciences and humanities. The extent to which these types of innovative property are covered by the ABS in the Australian national accounts and the survey of business expenditure on R&D (BERD) (*Research and Experimental Development, Businesses, Australia*, Cat. no. 8104.0) was examined and compared with the US study.

In brief, mineral exploration and copyright and licence costs are already capitalised by the ABS in the national accounts. The ABS survey of BERD clearly covers scientific R&D and R&D in social sciences and humanities. It also covers some aspects of product development costs in the financial industry and new architectural and engineering designs. Whether this coverage is as broad as that envisaged by CHS (2005) is examined in more detail below, together with issues of double counting. Fewer issues of double counting arise in the US and UK studies — the US R&D survey covers only scientific R&D, while the UK R&D survey does not cover the financial services industry.

### Business expenditure on R&D

R&D activity is generally defined as

Creative work undertaken on a systematic basis, in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications. (ABS Cat. no. 8104.0, 2005-06, p. 30)

More specifically it includes

Systematic investigation or experimentation involving innovation or technical risk. The outcome of which is new knowledge, with or without a specific practical application, or new or improved products, processes, materials, devices or services. R&D activity extends to modifications to existing products/processes. R&D activity ceases and pre-production begins when work is no longer experimental. (p. 34)

Data on scientific R&D expenditure are relatively well collected. CHS (2005) use US Census Bureau data, collected for the National Science Foundation, and includes mainly industrial R&D, covering the physical sciences, biological sciences, and engineering and computer science (but excluding geophysical, geological, artificial intelligence, and expert systems research) (CHS 2005, table 1.3).

---

### *Expenditure series*

A current price series for Australian BERD for the market sector (excluding Agriculture, forestry & fishing<sup>3</sup>) was available from Shanks and Zheng (2006).<sup>4</sup> This series covered 1968-69 to 2002-03. For this paper it was updated and extended to 2005-06 using revised and updated data from the ABS *Research and Experimental Development, Businesses, Australia, 2005-06* (Cat. no. 8104.0).<sup>5</sup>

The Shanks and Zheng dataset is primarily based on ABS Cat. no. 8104.0 and related unpublished data but has been adjusted in several ways. These adjustments are discussed in detail in appendix A of Shanks and Zheng (2006). The main adjustment was to approximate the market sector expenditure by deducting Property & business services (excluding Scientific research).<sup>6</sup>

It should be noted that the ABS BERD data includes R&D in social sciences and humanities (identified as a separate category of intangible in the US study). In this paper, the intangible category of ‘scientific R&D’ includes ‘R&D in social sciences and humanities’ The ABS BERD survey uses the Frascati definition of R&D (as described above), which includes R&D in fields classed as social sciences and humanities.

- For R&D undertaken by businesses themselves, the scope of the activity includes social sciences and humanities (for example, fields such economics; commerce, management, tourism and services; journalism, librarianship and curatorial services; language and culture; and the arts). To the extent that R&D in these fields is undertaken by businesses in the market sector, that R&D is included in the market sector BERD estimates discussed above.

---

<sup>3</sup> The ABS did not directly survey farms and other businesses in this industry until 2005-06. Generally R&D related to this industry is performed in government, higher education and private non-profit institutions, as well as by businesses classified to other industries (Shanks and Zheng 2006, p. A.3). Agriculture has been excluded from the 2005-06 data to maintain comparability over time.

<sup>4</sup> An electronic dataset is available at [http://www.pc.gov.au/research/staffworkingpaper/economicmodelling \[R&D stocks constructions \(domestic\) Ext Rel.xls: Series - adjusted BERD \(less PBS\)\]](http://www.pc.gov.au/research/staffworkingpaper/economicmodelling/[R&D%20stocks%20constructions%20(domestic)%20Ext%20Rel.xls:Series%20-%20adjusted%20BERD%20(less%20PBS)]) (accessed 31 October 2007).

<sup>5</sup> The series used is total expenditure on R&D, not just current expenditure. This means that there is some double counting of capital expenditure, as was also the case in the UK study. However, capital expenditure was only 6 per cent of total Australian BERD in 2005-06 (\$641 million out of \$10 081 million).

<sup>6</sup> Some non-market sectors could not be excluded because of lack of disaggregated data. The industry ‘Scientific Research’ (ANZSIC 781) was not excluded because it undertakes R&D principally for other industries. The R&D of this industry was therefore redistributed to the other industries using a breakdown by socio-economic objective of the R&D, so as to obtain the market sector portion of this research. See Shanks and Zheng (2006, appendix A) for further details.

- 
- In addition, the market sector BERD estimates include a portion of ANZSIC industry 7810 Scientific research. The scope of this industry also includes social sciences as well as agricultural, biological and physical sciences.

van Rooijen-Horsten et al. (2008, p. 12) note that it is possible that an R&D survey based on Frascati definitions of R&D would result in an underestimation of R&D in social sciences and humanities (as well as R&D in financial services). This is because ad hoc R&D is common in social sciences, humanities and financial services industries rather than systematic R&D (as would be required to meet the Frascati definition of R&D). However, in the absence of any measure of the likely understatement, in this paper (as in van Rooijen-Horsten et al. 2008) it is assumed that the BERD survey correctly measures R&D in social sciences and humanities.

While R&D in social sciences and humanities was separately identified in the US and UK studies of intangibles this has not been possible for this paper.<sup>7</sup> A separate consistent time series for this subset of R&D was not readily available for Australia.

It should also be noted that the ABS BERD data does include some R&D related to financial services and architectural/engineering services. It appears that the scope of these types of R&D as discussed in CHS (2005) is broader than those activities that may be covered by the BERD survey. For this reason the CHS method has been used to estimate these components of R&D (as discussed below). The ABS BERD data have therefore been adjusted, where possible, to avoid double counting of these types of R&D under Scientific research. For R&D in financial services it has been possible to construct a series for the financial services industry component of the ABS BERD estimates<sup>8</sup> and reduce BERD by this amount. Insufficient data are available to make any adjustment for ‘new architectural and engineering designs’ (the extent of any duplication is discussed below under that heading).

### *Investment series*

Marrano and Haskel (MH 2006) exclude expenditure on R&D in the computer industry from its investment series in order to avoid double counting with software. It has not been possible to make this exclusion for this paper. However, much of software R&D would be undertaken by the Computer services industry (part of Property and business services and outside the market sector) and is already excluded from the Shank and Zheng estimates of BERD for the market sector.

---

<sup>7</sup> R&D in social sciences was also included with Scientific R&D for Finland and the Netherlands. For the Japanese study this category was not included at all due to lack of data.

<sup>8</sup> Data are available for expenditure on R&D by the financial services industry from 1986-87 to 2005-06. Prior to this R&D for the financial services industry was included in ‘Other nec’ and the growth in this series has been used to backcast the financial services industry series.

---

In line with CHS (2006) the whole of BERD for the market sector was considered investment. The expenditure series was deflated by the implied market sector GVA deflator (base year 2005-06) to obtain the real investment series.

### *Capital series*

The capital stock series was constructed using the perpetual inventory method (PIM), as described in chapter 4, with an assumed 20 per cent depreciation rate. This was in line with the rate used in CHS (2005, p. 23), which is assumed to be the mid-range of rates reported in the literature. As discussed in chapter 4, instead of selecting a year when the initial stock is equal to zero, the alternative method was used in which the initial stock for the first year of the data series is estimated by dividing that year's investment by the sum of the depreciation rate and the trend growth rate over years for which investment data are available.

## **Mineral exploration**

As noted above, mineral exploration is already capitalised into the national accounts by the ABS and these data are used in this paper. There is no overlap between R&D carried out for Mining, such as the development of new exploration techniques and associated research, which is included in Scientific R&D, and mineral exploration as currently capitalised, which is the use of existing exploration techniques.

CHS (2005, table 1.3) include mining R&D and mineral exploration, having excluded mining R&D from scientific research. The UK study includes mining R&D under scientific R&D, and therefore includes only mineral exploration in its estimate of this intangible.

## **Artistic originals**

As noted above, artistic originals are already capitalised into the national accounts by the ABS and these data are used in this paper. The ABS defines entertainment, literary or artistic originals as:

... originals of films, sound recordings, manuscripts, tapes, models, etc., on which drama performances, radio and television programming, musical performances, sporting events, literary and artistic output, etc., are recorded or embodied. (ABS 2000, p. 454)

The UK, Finnish and Netherlands studies also use artistic originals as defined under the System of National Accounts (SNA93). This measure appears to have similar coverage to the copyright and licence cost intangible in CHS (2005), which is

---

proxied by development costs in the motion picture industry plus double new product development costs for motion pictures as crude proxy for development costs in radio, TV, sound recording and book publishing industries. MH (2006, p. 6) note that while the national accounts measure may not cover as wide a definition as envisaged by CHS it probably covers the main expenditures of this type.

### **Other product development, design and research**

Traditional definitions of R&D exclude items such as design and some non-scientific research. However, the Frascati Manual (OECD 2002) in its proposed standard practice for surveys on R&D does include R&D activities beyond the traditional scientific R&D, such as R&D in banking and insurance, other service industries and R&D in social sciences and humanities. This is the classification system used by the ABS in its survey of business R&D. Therefore the estimates of BERD will include some of these ‘other product development, design and research’ listed in CHS (2005). The scope of the measures used in this paper for each type of other product R&D is discussed below.

#### *New product development costs in the financial industry*

CHS (2005) use a crude proxy for spending on new product development by the financial services industry of 20 per cent of total intermediate purchases of that industry. CHS (2006, p. 18) note

Many new products in the financial services industry involve computerized information; to avoid double-counting (particularly with the own-account portion of computer software), we deliberately were very conservative in our estimates for this component.

MH (2006, p. 7) improve on this crude proxy by deducting purchases of intermediate inputs counted elsewhere in intangibles — that is, advertising, software, consulting services and architectural and engineering activities.

The ABS BERD survey follows the Frascati Manual classification of R&D. Examples of R&D in banking provided in the Frascati Manual (OECD 2002, pp. 49–50) include:

- Mathematical research relating to financial risk analysis.
- Development of risk models for credit policy.
- Experimental development of new software for home banking.
- Development of techniques for investigating consumer behaviour for the purpose of creating new types of accounts and banking services.

- 
- R&D related to electronic banking and insurance, Internet-related services and e-commerce applications.
  - R&D related to new or significantly improved financial services (new concepts for accounts, loans, insurance and saving instruments).

Australian BERD would therefore appear to cover at least some of the types of developments envisaged by CHS (2006), although no specific examples were given in their paper. van Rooijen-Horsten et al. (2008, p. 12) note that it is possible that an R&D survey based on Frascati definitions of R&D would result in an underestimation of R&D in financial services industries. They suggest that ad hoc R&D is common in the financial services industries and is excluded from the Frascati definition of R&D since it is not undertaken on a systematic basis.

Estimates based on the CHS method were compared with the financial services industry component of the ABS BERD survey and found to be considerably smaller.<sup>9</sup> For comparability with the US study, the CHS method of estimating financial services R&D has been used in this paper.<sup>10</sup> To avoid double counting, the financial services industry component of total BERD from the ABS R&D survey has been excluded from Scientific research (as noted above).

However, it should be noted that if the ABS estimate of financial services industry R&D does cover all relevant R&D activity in this industry, the CHS-type estimate will represent a considerable overstatement of this intangible.

### *Expenditure series*

The financial services industries of interest in the Australian context are a subset of ANZSIC Division K Finance & insurance — that is, Finance (ANZSIC 73) and a share of Services to finance and insurance (ANZSIC 75).

For this paper, a series for total intermediate purchases by the financial services industries has been constructed from ABS data from input-output (IO) and supply-use (SU) tables. The SU industry codes equivalent to ANZSIC 73 and 75 are 380 Finance and 400 Services to finance, investment and insurance. The share of Services to finance, investment and insurance is based on the output share of Finance in the combined output of Finance and Insurance.

---

<sup>9</sup> In 2005-06 the ABS BERD survey (Cat. no. 8104.0) reported total expenditure on R&D by Finance & insurance of \$902 million, which equates to only 16 per cent of the estimate using the CHS methodology. It is estimated that this percentage ranged from 2 to 17 per cent over the full period examined.

<sup>10</sup> Both the US and UK surveys of R&D do not include financial services.

---

An unpublished ABS SU data series was obtained for 1994-95 to 2003-04. To construct a data series covering the period 1974-75 to 2005-06 it was necessary to backcast and forecast sections of the data series. To backcast the period to 1974-75 a series for total intermediate purchases of financial services industries was assembled from ABS published IO tables, in the same manner as for the SU tables. The IO tables were available annually up to 1993-94, except for 1976-77, 1977-78, 1984-85, 1985-86, 1987-88, 1988-89, 1990-91 and 1991-92. The data for the missing years was interpolated and then the year on year growth rates from this series were applied to backcast the actual SU data series.<sup>11</sup> The last two years of the SU series were then forecast on a linear growth path based on the actual SU data series. The resulting series was smoothed using a 3-period moving average.<sup>12</sup>

In line with CHS (2005), 20 per cent of intermediate purchases was counted as expenditure on financial services R&D. The Finance & insurance industry is part of the market sector so all expenditure on this intangible is relevant to a market sector estimate.

#### *Investment series*

Deductions of specific intermediate inputs (as suggested by MH 2006) have not been made. The need to combine irregular data from different sources in different classifications would have made any adjustment of this kind very imprecise. Some account of the potential for double counting is made by using the CHS (2006) ‘conservative’ 20 per cent of total intermediate purchases.

The investment series was deflated by the implied Finance & insurance gross value added (GVA) deflator.

#### *Capital series*

The capital stock series was constructed using PIM, as described in chapter 4, with an assumed depreciation rate of 20 per cent. This is in line with CHS (2006, p. 23) — based on the mid-range of rates for R&D in general (not specifically this type of R&D) reported in the literature.

---

<sup>11</sup> The IO intermediate usage series is in basic prices while the SU series is in purchaser prices. This backcasting method therefore assumes no major change in the rate of taxes, subsidies and margins (the difference between basic and purchaser prices).

<sup>12</sup> The series was smoothed to remove some volatility caused by changes in classifications. The ABS cautions against interpreting IO data as a time series.

---

### *New architectural and engineering designs*

CHS (2005) estimate this intangible as half of the revenue of the architectural and engineering industries. MH (2006) use 50 per cent of architectural and engineering activities industry turnover (after deducting industry purchases of advertising, software and consulting to avoid double counting with other intangibles). They also add twice the turnover of another industry, specialty design activities, as an estimate of own account new designs. Fukao et al. (2008b) estimate this intangible using input-output table data for new architectural design and service industry survey data for engineering design.

The Frascati Manual (OECD 2002) includes engineering and architectural R&D amongst the fields covered and these are also included in the ABS BERD survey. There are few details given in CHS (2005) as to the nature of the new architectural and engineering designs that make up this intangible asset in their study. However, it appears clear that the activities the authors have in mind fall outside what would 'normally' be considered architectural and engineering R&D — an example may be new designs using existing technology and methods — since their data source for 'scientific R&D' already includes engineering R&D in its scope. It is therefore assumed there is no issue of double counting between a CHS-type measure for Australia and activities covered above under the ABS BERD survey.

It is also the case that the ABS already capitalises some portion of architectural services (allocated to dwellings capital expenditure) and consulting engineering services (allocated to non-dwelling construction capital expenditure).<sup>13</sup> Sufficient data to make an adjustment for double counting with the CHS-type measure were not available. However, in the case of architectural services there should not be any overlap with an estimate for the market sector since dwellings capital falls outside the market sector.

### *Expenditure series*

A time series of revenue of architectural and engineering industries was constructed for this paper using a number of data sources. The relevant industries for new designs are ANZSIC 7821 Architectural services and ANZSIC 7823 Consulting engineering.

---

<sup>13</sup> The Dutch and Finnish studies (RBT 2008 and Jalava, Aulin-Ahmavaara and Alanen 2007) both refer to a large part of architectural and engineering design expenditure being registered as investment in the national accounts. In those studies, this investment is deducted from tangible capital and separately identified.

---

Data on revenue for ANZSIC industry classes are available from *Australian Industry* (ABS Cat. no. 8155.0).<sup>14</sup> Sales of goods and services/operating income is available for 1998-99 to 2000-01 and 2002-03 and total income (including other income such as interest income) for 2002-03 to 2004-05. Sales of goods and services is the most relevant measure so the growth rate in total income for the latter period was applied to sales in 2002-03 to estimate this series to 2004-05. The 2005-06 estimate was made assuming that growth rate for sales was the same as in 2004-05.

To estimate data for the missing years and backcast the aggregate series of architectural and engineering services to 1974-75, the growth rates for Australian production in published data for a related group of services from the product details of the ABS *Australian National Accounts: Input-Output Tables* (Cat. no. 5215.0) and unpublished SU tables were used.<sup>15,16</sup>

The SU data were used to backcast from 1998-99 to 1994-95 and derive an estimate for 2001-02. The most recent data in the SU tables (1994-95 to 2002-03) cover Architectural services, surveying, consulting engineering and quantity surveying (SUPC 43020).<sup>17</sup> Surveying (equivalent to ANZSIC 7822) is not included above but accounts for only a small proportion of the combined total of ANZSIC 7821-7823 (for example, 7 per cent in 2004-05) and should not distort the growth rate to any great extent for this purpose.

The IO Australian production data were used to backcast from 1998-99 to 1974-75. The IO tables cover selected years over the period 1974-75 to 2001-02.<sup>18</sup> There has been a variety of classification changes over time but a reasonably consistent series is available for the sum of Architectural services, Surveying and Consulting engineering (including Technical services nec which is not included above) for the period 1974-75 to 1986-87.<sup>19</sup> In 1989-90 and 1992-93 there were classification

---

<sup>14</sup> Prior to 1998-99 there were some irregular surveys of selected technical services (for example, *Technical Service, 1992-93*, ABS Cat. no. 8676.0 and *Engineering and Technical Services Industry, 1987-88*, Cat. no. 8666.0) but data from these surveys was not comparable as a result of definitional changes.

<sup>15</sup> Product data included the amount of that product produced by all industries not just the main industry that produces that product. However, in this case most of these services are produced by one industry.

<sup>16</sup> The series was smoothed with a 3-period moving average to remove some volatility due to classification changes.

<sup>17</sup> There is no equivalent group in the SU tables from 2003-04 onwards because of a change in classification.

<sup>18</sup> Annual except for 1975-76, 1976-77, 1984-85, 1985-86, 1987-88, 1988-89, 1990-91, 1991-92, 1995-96, 1997-98, 1999-00 and 2000-01.

<sup>19</sup> Unable to exclude Surveying because of apparent changes in classification over time.

---

changes that affected the growth rate but there were no readily available data to use to adjust for these changes. The missing years in the IO series were interpolated by simple averages.

The resulting series for sales income for architectural and engineering design services was for the total economy (that is, Australian production of these services<sup>20</sup>). It was necessary to scale it down to the share relevant to market sector intermediate usage. Using the SU tables the market sector intermediate usage share of Australian production of SUPC 43020 Architectural, surveying, consulting engineering and quantity surveying services was calculated for 1994-95 to 2002-03.<sup>21</sup> This share was backcast to 1974-75 and forecast for 2003-04 to 2005-06 using growth in the market sector share of gross value added.<sup>22</sup>

In line with CHS (2005), 50 per cent of the derived sales series was counted as expenditure on new architectural and engineering designs.

#### *Investment series*

Deductions of specific intermediate inputs (as suggested by MH 2006) have not been made due to lack of data. Nor has any additional estimate been made of own account design.

The investment series was deflated by the implied market sector GVA deflator.

#### *Capital series*

The capital stock series was constructed using PIM, as described in chapter 4, with an assumed depreciation rate of 20 per cent, in line with CHS (2006, p. 23).

---

<sup>20</sup> Insufficient data were available to make any adjustment for any difference between exports and imports of these services. The estimates implicitly assume net exports are zero — if net exports are positive (negative) then the estimates will be overstated (understated).

<sup>21</sup> This share was smoothed using a 3-period moving average to remove volatility.

<sup>22</sup> Intermediate usage data from IO tables for a broader group of services (Scientific research, technical and computing services) that includes architectural and engineering services) were examined but the series was quite volatile — partly due to changes in classifications over time. The ABS cautions against using such data as a time series.

---

## A.3 Expenditure on economic competencies

Economic competencies are defined by CHS (2005, p. 28) as the value of brand names and other knowledge embedded in firm-specific human and structural resources.

### Brand equity

Spending on brand development is proxied by spending on advertising and market research. CHS (2005, p. 28) suggest this includes the costs of launching new products, developing customer lists and maintaining brand equity and note that

Although advertising and market research are generally aimed at building a firm's market share at the expense of its competitors, such spending is necessary for developing new brands and maintaining the value of existing brands.

Various rationales have been put forward for capitalising advertising and marketing expenditures — they may result in a positive image of the firm in the market and help to secure future orders (De and Dutta 2007); and they may establish a reputation for quality or educate consumers about the existence of new goods (Nakamura 1999, p. 6). A reputation for reliability may persuade shoppers to try a new item for the first time.

### *Advertising*

CHS (2005) and Marrano, Haskel and Wallis (MHW 2006) estimate this intangible using data on advertising spending as collected by advertising associations. Fukao et al. (2008b) use advertising industry output from the national accounts. In all three studies 60 per cent of the expenditure on advertising was treated as investment.<sup>23</sup>

### *Expenditure series*

Advertising expenditure by media sector is available from an annual survey of the industry conducted by Commercial Economic Advisory Service of Australia (CEASA 2003, 2006, 2007). This expenditure includes only media costs, not advertising agency commission, production costs or any other costs than for time

---

<sup>23</sup> US data included all commissions as well as the art, mechanical and production expenses that are part of the advertising budget for each medium (Universal McCann 2007). UK data also included production costs (Advertising Association 2005).

---

and space. This is a similar type of data source to that used in the overseas studies, except for the exclusion of production costs.

Hamilton and Denniss (2000, p. 55), stated that data on Australian production costs of advertisements, such as recording, editing and graphic design, are not available. This still appears to be the case. The production activities undertaken for advertising are also undertaken for other purposes. ABS data is not sufficiently disaggregated to identify the share relevant to advertising.

As the most readily available and complete time series of advertising expenditure for the total Australian economy, the CEASA series has been used. Data were compiled for 1974-2006. An adjustment was then made for production costs.

There are some readily available data on the likely share of production costs in total advertising expenditure in the United States. Data on total advertising expenditure are available from Universal McCann (2007) (as used in CHS 2006) and advertising expenditure excluding production costs from CEASA (2003, 2006, 2007). Production costs averaged 44 per cent of total advertising expenditure between 1993 and 2006. A similar calculation for the United Kingdom for 2004, using data from MHW (2006) and CEASA (2006), puts the UK share at 52 per cent. This assumes the data sources with and without production costs are reasonably comparable, which they appear to be.

Based on these data it is assumed that Australian advertising expenditure excluding production costs is 50 per cent of total advertising expenditure. Therefore the CEASA series, which excludes production costs, has been multiplied by two. The CEASA calendar year data were also averaged to derive a financial year series.

This has been scaled down to a market sector estimate using market sector intermediate usage as a share of Australian production<sup>24</sup> of advertising services from the ABS SU tables for 1994-95 to 2003-04.<sup>25</sup> This share was backcast to 1974-75 and forecast for 2004-05 and 2005-06 using growth in the market sector share of gross value added.<sup>26</sup>

---

<sup>24</sup> Insufficient data were available to make any adjustment for any difference between exports and imports of these services. The estimates implicitly assumes net exports are zero — if net exports are positive (negative) then the estimates will be overstated (understated).

<sup>25</sup> This share was smoothed using a 3-period moving average to remove volatility.

<sup>26</sup> Intermediate usage data from IO tables for a broader group of services (Legal, accounting, marketing and business management services) were examined but the series was quite volatile — partly due to changes in classifications over time. The ABS cautions against using such data as a time series.

---

### *Investment series*

The extent to which expenditure on advertising is building an asset rather than being consumed is a separate issue. MH (2006, p. 8) suggest this is a difficult question.

An advertisement proclaiming the reliability of a good would seem, at least in part, to be expenditure on an asset. An advertisement proclaiming a price reduction for the next two weeks would seem to be better thought of as an intermediate spending, although if it is building a reputation for lower prices that would be an asset.

There are two issues — does the ad build an asset and how long lived is it? Some studies deducted from the expenditure series those types of ads not considered to be asset building at all. The US study only included the national ads as they were considered to be those aimed at selling specific products rather than promoting sales at specific stores (CHS 2005, p. 33). The UK study excluded classified ads (small personal ads by individuals or recruiting advertisements for vacancies to be filled in a relatively short time period) (MH 2006, p. 8). It has been possible to deduct classifieds and directories from the CEASA series for Australia.

Further adjustments were then made to account for ads that had short-lived effects. Those ads with a service life of less than one year would be an expense not an investment. CHS (2005, p. 32) note that while the literature finds that the effects of advertising are generally short-lived, more than half has a service life of at least one year. From this they assumed that 60 per cent of total advertising expenditures should be counted as investment.

In this study it will be assumed that 60 per cent of expenditure is an investment — this will provide comparability with the overseas studies.

The series was deflated by the implied market sector GVA deflator.

### *Capital series*

The capital stock series was constructed using PIM, as described in chapter 4, with an assumed depreciation rate of 60 per cent. CHS (2006, p. 24) noted that the literature reports a wide range of findings on the longevity of advertising capital — with studies estimating service lives of between 0 and 7 years. They concluded that advertising has a service life of less than 3 years, implying a geometric rate of depreciation of 60 per cent.

---

## *Market research*

CHS (2005) and MH (2006) estimate this intangible as twice the revenue of the market and consumer research industry. The use of twice industry revenue is to estimate firm's own account spending on market research.

## *Expenditure series*

A time series of revenue of the market research industry was constructed for this paper using a number of data sources. The relevant industry is ANZSIC 7853 Market research services.

Data on revenue for ANZSIC industry classes are available from *Australian Industry* (ABS Cat. no. 8155.0). Sales of goods and services/operating income is available for 1998-99 to 2000-01 and 2002-03 and total income (including other income such as interest income) for 2002-03 to 2004-05. Sales of goods and services is the most relevant measure so the growth rate in total income for the latter period was applied to sales in 2002-03 to estimate this series to 2004-05. The 2005-06 estimate was made assuming that the growth rate for sales was the same as in 2004-05.

Prior to 1998-99, an irregular survey, *Selected Business Services, 1992-93* (ABS Cat. no. 8677.0) was carried out. From this survey data on sales of goods and services was available.<sup>27</sup>

The estimates for the missing year 2001-02 was interpolated by simple averages.

To backcast the series of market research services from 1992-93 to 1974-75, the growth in published data for a related group of services from the product details of the ABS *Australian National Accounts: Input-Output Tables* (Cat. no. 5215.0) was used.<sup>28</sup> The IO tables cover selected years over the period.<sup>29</sup> There has been a variety of classification changes over time but a reasonably consistent series is

---

<sup>27</sup> An irregular survey conducted in 2001-02 (*Market Research Services*, ABS Cat. no. 8556.0) but this had a different coverage of business services and was not comparable.

<sup>28</sup> Product data included the amount of that product produced by all industries not just the main industry that produces that product. However, in this case most of these products (or services in this case) are produced by one industry.

<sup>29</sup> Annual except for 1975-76, 1976-77, 1984-85, 1985-86, 1987-88, 1988-89, 1990-91, 1991-92, 1995-96, 1997-98, 1999-00 and 2000-01.

---

available for the sum of market and business services to 1991-92.<sup>30</sup> Missing years were interpolated by simple averages.

The resulting series for sales income for market research services was for the total economy (that is, Australian production of these services<sup>31</sup>). It was necessary to scale it down to the share relevant to market sector intermediate usage using data on the closest available group of services. Using the SU tables the market sector intermediate usage share of Australian production of SUPC 43031 Other business services (which includes market research services among many other services) was calculated for 1994-95 to 2003-04.<sup>32</sup> This share was backcast to 1974-75 and forecast for 2004-05 and 2005-06 using growth in the market sector share of gross value added.<sup>33</sup>

In line with CHS (2005), this series was doubled to obtain total expenditure on market research including own account market research.

#### *Investment series*

The expenditure series was adjusted to account for some market research information having a service life of less than one year. In this study it will be assumed that 60 per cent of expenditure is an investment — this will provide comparability with the overseas studies. The investment series was deflated by the implied market sector GVA deflator.

#### *Capital series*

The capital stock series was constructed using PIM, as described in chapter 4, with an assumed depreciation rate of 60 per cent, in line with CHS (2006, pp. 23–4) and the same as for advertising. This is based on a service life of less than 3 years, the average of the range reported in the advertising literature (see the discussion of advertising above).

---

<sup>30</sup> The series was smoothed with a 3-period moving average to remove some volatility due to classification changes.

<sup>31</sup> Insufficient data were available to make any adjustment for any difference between exports and imports of these services. The estimates implicitly assumes net exports are zero — if net exports are positive (negative) then the estimates will be overstated (understated).

<sup>32</sup> This share was smoothed using a 3-period moving average to remove volatility.

<sup>33</sup> Intermediate usage data from IO tables for a broader group of services (Legal, accounting, marketing and business management services) were examined but the series was quite volatile — partly due to changes in classifications over time. The ABS cautions against using such data as a time series.

---

## Firm-specific human capital

CHS (2005, p. 29) suggest that spending on firm-specific human capital can be measured by the costs of workforce training and education. Spending on workforce training consists of two types of expenses:

- direct firm expenses (outlays on inhouse and external training)
- wage and salary costs of employee time spent in informal and formal training.

### *Expenditure series*

No single data source provides a time series of employer-provided training expenditure. To construct a series, several different sources were used, together with a number of assumptions. The resulting series is therefore only indicative.

The ABS *Employer Training Expenditure, Australia* (Cat. no. 6353.0), an employer survey, measured both direct costs and wage and salary costs for the total economy (excluding agriculture) for July to September<sup>34</sup> 1989, 1990, 1993 and 1996. The ABS also estimated this measure for 2001-02 based on data from *Employer Training Expenditure and Practices* (Cat. no. 6362.0) and *Education and Training Experience* (Cat. no. 6278.0) (NCETS 2004).<sup>35</sup> Specifically the measure includes

The sum of employers' expenditure for employees gross wages and salaries for time receiving and providing structured training, fees paid to consultants and institutions and other expenditure on structured training. (ABS Cat. no. 6353.0, 1996, p. 46)

where structured training is defined as

all training activities which have a predetermined plan and format designed to develop employment-related skills and competencies. It consists of periods of instruction, or a combination of instruction and monitored practical work. (ABS Cat. no. 6353.0, 1996, p. 45)

---

<sup>34</sup> These were multiplied by four to arrive at financial year estimates for 1989-90, 1990-91, 1993-94 and 1996-97.

<sup>35</sup> It has not been possible to assess the effect of differences between these surveys on the trend in the expenditure data. However, the ABS did make some adjustments for differences in scope to the expenditure data reported in NCETS (2004) for its comparison across surveys.

---

No adjustment was made to account for Agriculture so the estimates will be an understatement.<sup>36</sup>

For 1993-94 and 1996-97 expenditure data were also available by industry enabling the construction of a market sector (excluding Agriculture) total. For 1990-91, the market sector estimate was derived by using the total economy growth in expenditure between 1990-91 and 1993-94. (This assumes a constant market sector share over this period.) For 1989-90 total expenditure was not available — data were only available for the total economy average of expenditure per training hour and training hours per employee. These data were used with the estimated training hours series for the market sector (discussed below) to derived total training expenditure for the market sector.

For 2001-02 the market sector estimate was derived by using total economy growth in expenditure between 1996-97 and 2001-02, adjusted for the fall in market sector share of total hours of training from ABS *Education and Training Experience, Australia* (Cat. no. 6278.0).

To complete the expenditure series it was necessary to use growth in a related series. No ideal series was available, but it was possible to construct an approximate series for total training hours for the market sector (excluding Agriculture). Hours of training per *market sector* employee was available for 1993-94 and 1996-97 from ABS Cat. no. 6353.0. The same measure for *all* employees was available from the same source for 1989-90, 1990-91, 1993-94 and 1996-97. The growth rate in this series was used to estimate the market sector measure for 1989-90 and 1990-91. It was also possible to derive hours of training per market sector employee from ABS Cat. no. 6278.0 for 1996-97, 2000-01 and 2004-05.<sup>37</sup> Because of differences in survey coverage and methodology between these two surveys<sup>38</sup>, the growth rate from Cat. no. 6278.0 was applied to the Cat. no. 6353.0 series to estimate it for 2000-01 and 2004-05. In the absence of any other data, a time series of training hours per market sector employee from 1974-75 to 2006-07 was completed by assuming linear growth in that measure between the data points discussed above

---

<sup>36</sup> Sufficient data were not available to estimate a time series for training expenditure for Agriculture. However, Richardson (2004, p. 31) notes that Agriculture offers particularly low levels of training (around 60 per cent of the total industries average for training hours per employee in 1996).

<sup>37</sup> Total training hours for the market sector were available from table 26 of the 2005 issue of Cat. no. 6278.0. The market sector employee numbers to which these training hours related were estimated using the market sector share of total employees from *Labour Force, Australia* (ABS Cat. no. 6291.0) and total employees (excluding owner managers) from Cat. no. 6278.0. Training hours per market sector employee was derived from these data.

<sup>38</sup> ABS Cat. no. 6353.0 is an employer survey while Cat. no. 6278.0 is an employee survey that covers the four most recent training courses undertaken by an employee.

---

and a constant level of hours per employee from 1974-75 to 1989-90 (at the 1989-90 level) and for 2005-06 (at the 2004-05 level).<sup>39</sup> This was used in conjunction with a series for market sector employees<sup>40</sup> to derive a series for market sector total hours of training.

The actual training expenditure data points were deflated using an index of average weekly ordinary time earnings for full-time adult employees in the total economy (excluding Agriculture) from *Average Weekly Earnings* (ABS Cat. no. 6302.0).<sup>41</sup> This provided real expenditure for these years. This was then used to calculate a real expenditure per hour of training. An exponential trend was fitted to this data and used to estimate real cost per hour from 1974-75 to 1988-99 and from 2002-03. Linear growth in cost per hour was assumed between the actual cost data points from 1990-91 to 2001-02. Multiplying real costs per hour and total hours, a market sector total expenditure was derived for the missing years to complete the real training cost series for the market sector.

---

<sup>39</sup> These assumptions are crude, particularly for the earlier period. However, they are made for transparency in the absence of sufficient data to fit a trendline. There are breaks in series caused by the Training Guarantee, which was introduced in 1990, suspended in 1994 and abolished in 1996 (ABS Cat. no. 6353.0, 1996). The Training Guarantee required employers with a payroll above a set amount to spend a minimum amount on training equivalent to a specific proportion of their gross wages and salaries. Apart from the 1989 ABS data, there are no reliable and comparable measures of training expenditure prior to the introduction of the Training Guarantee. The Business Council of Australia (BCA) survey from the mid-1980s, often cited to suggest that training levels in Australia were lower than other countries (see, for example, Curtain, Kravac and Stretton 1986), does not provide a measure that is comparable with the ABS data. It has also been suggested that the BCA survey, as a small survey designed to gather data about total labour oncosts, provides highly unreliable estimates of small components of this total, such as training costs (Stromback and Moy 1989).

The ABS data post-1996 are suggestive of a decrease in training hours after the removal of the Training Guarantee. However, as noted by Long (2002, p. 8), decreases in training hours do not necessarily indicate a decrease in training effort because of the possibility of increased efficiency of training delivery.

<sup>40</sup> The employee numbers from ABS Cat. no. 6353.0 (from which the cost data are taken) do not correspond to the standard series from the Labour Force Survey (even after excluding Agriculture). For consistency with the training survey data, the growth rate in the LFS employed persons series (ABS Labour Force Timeseries 6291.0.55.003 EO5\_nov84 and aug\_94 and 6204.0.55.001 Labour Force Historical Timeseries, Australia, 1966 to 1984) was applied to the employee numbers from Cat. no. 6353.0 at either end of the series (pre 1990-91 and post 1996-97). The missing years in between these two years were filled using a linear trend between the actual data points (rather than growth in the employed numbers from the LFS, because of differences in trends over these short time periods).

<sup>41</sup> This was available back to 1983-84. This was backcast using the Reserve Bank of Australia historical series for average weekly ordinary time earnings for full-time adult employees to 1980-81 and average weekly total earnings for full-time adult employee to 1974-75 (RBA 2008).

---

It should be noted that the 2001-02 training expenditure data suggest a large increase in real training costs per hour compared with 1996-97, while training hours per employee appear to have fallen. It has not been possible to determine the extent to which this may reflect differences in the ABS surveys from which these data are derived. However, the ABS data also show a large increase in fees paid to external trainers (NCETS 2004, table 2). This may mean that a change in pattern of training provision has affected costs per hour of training. It may also reflect a change in the composition of those participating in training (for example, those in higher paid employment representing a larger proportion of total participants) or a change in the quality of the training.

### *Investment series*

All such expenditure is counted as investment, in line with overseas studies.

The process of constructing the expenditure series was done in real terms (using the average weekly earnings deflator), so no further deflation was required to get the real investment series.

### *Capital series*

The capital stock series was constructed using PIM, as described in chapter 4, with an assumed depreciation rate of 40 per cent. This was the rate assumed by CHS (2006, p. 24), an average of the depreciation rates of brand equity and R&D (see discussion under organisational capital).

## **Organisational capital**

This intangible, along with firm specific human capital, is particularly difficult to estimate. However, CHS (2006, p. 18–9) note that importance of organisational capital requires its treatment as an investment for consistency with other assets. They also cite micro data evidence that firm level differences in organisational practices are strongly related to productivity.

MH (2006, p. 11) liken the measurement problem of establishing a volume of organisational capital from observed expenditure to that of establishing the volume of R&D knowledge capital from observed expenditure on R&D. An additional problem is that expenditure on organisational capital is unobserved.

CHS (2005, p. 29) suggest that investment in organisational capital is made up of two components

- 
- purchased — such as management consultant fees
  - own account — measured in terms of the value of executive time spent on improving the effectiveness of business organisations (that is, time spent on developing business models and corporate cultures).

CHS (2005, pp. 29–30) note that

Consulting expenditure and the estimated value of executive time conceptually overlap by a small amount (the value of executive time in the management consulting industry). In addition, some portion of management time arguably overlaps with R&D, so that, for some industries, the line between industry-specific process innovation and organizational change more generally may not be easily drawn. But, whatever uncertainty the amount induces in our estimates, it is dwarfed by the use of an arbitrary fraction for the amount of executive time devoted to organizational change and development.

MH (2006, p. 12) also suggest some overlap with IT consulting and software investment. They also note that some expenditure on management consultants is to deal with short term problems (for example, closing down businesses and discharging employees).

### *Purchased*

CHS (2005) estimate this intangible from the revenue of the management consulting industry. Only 80 per cent of this revenue is included to account for the portion devoted to short term problems.<sup>42</sup> Fukao et al. (2008b) were not able to find data for the consulting industry in Japan, so instead use the output of the closest relevant industry (law and accounting business services) from input-output tables.

### *Expenditure series*

It has been noted in studies of the Australian management consulting industry that there is a paucity of available data (see, for example, Kitay and Wright 1999 and Gowen 1999). The measurement difficulties are compounded by the industry being

---

<sup>42</sup> CHS (2005, p. 34) note that little is known about the composition of purchased management expertise but they have a strong suspicion that a portion of these costs are current expenses rather than investment. They make an arbitrary deduction of 20 per cent of the spending estimate to arrive at the estimate for investment. There are some anomalies in the treatment of purchased organisational capital across the papers using the CHS method — in some cases the 20 per cent deduction is made to the own-account spending estimate instead. However, it seems clear that the original CHS methodology intended that the deduction be made to purchased component of spending rather than own account spending component (which they note was developed by explicitly considering what was investment).

---

defined in various ways and changes in the range of activities undertaken by management consultants over time.

For this paper, a time series of revenue of the management consulting industry was therefore constructed using the few data sources available for the business management services industry (ANZSIC 7855). This industry is broader than just management consultancy — for example, it includes public relations consultancies (which are excluded from the UK and US studies). An adjustment for this difference of scope is discussed below.

Data on revenue for ANZSIC industry classes are available from *Australian Industry* (ABS Cat. no. 8155.0). Sales of goods and services/operating income is available for 1998-99 to 2000-01 and 2002-03 and total income (including other income such as interest income) for 2002-03 to 2004-05.<sup>43</sup> Sales of goods and services is the most relevant measure so the growth rate in total income for the latter period was applied to sales in 2002-03 to estimate this series to 2004-05. The 2005-06 estimate was made assuming that the growth rate for sales was the same as in 2004-05. The estimates for the missing year 2001-02 was interpolated by simple averages.

To backcast the series of business management services from 1998-99 to 1974-75, the growth in published data for a related group of services from the product details of the ABS *Australian National Accounts: Input-Output Tables* (Cat. no. 5215.0) was used.<sup>44</sup> The IO tables cover selected years over the period.<sup>45</sup> There has been a variety of classification changes over time but a reasonably consistent series is available for the sum of market and business services.<sup>46</sup> Missing years were interpolated by simple averages.

---

<sup>43</sup> Prior to 1998-99, an irregular survey, *Selected Business Services, 1992-93* (ABS Cat. no. 8677.0) was carried out. However, this was not used because of an apparent break in series. Gowen (1999) suggests the 1992-93 figure considerably understates revenue but provides no firm alternative estimate.

<sup>44</sup> Product data included the amount of that product produced by all industries not just the main industry that produces that product. However, in this case most of these products (or services in this case) are produced by one industry.

<sup>45</sup> Annual except for 1975-76, 1976-77, 1984-85, 1985-86, 1987-88, 1988-89, 1990-91, 1991-92, 1995-96, 1997-98, 1999-00 and 2000-01.

<sup>46</sup> The series was smoothed with a 3-period moving average to remove some volatility due to classification changes.

---

The resulting series for sales income for business management services was for the total economy (that is, Australian production of these services<sup>47</sup>). It was necessary to scale it down to the share relevant to market sector intermediate usage using data on the closest available group of services. Using the SU tables the market sector intermediate usage share of Australian production of SUPC 43031 Other business services (which includes business management services among many other services) was calculated for 1994-95 to 2003-04.<sup>48</sup> This share was backcast to 1974-75 and forecast for 2004-05 and 2005-06 using growth in the market sector share of gross value added.<sup>49</sup>

A final adjustment was made to account for the broader scope of ANZSIC 7855 Business management services compared with the other studies. There is very limited information about the size of the public relations segment of this industry. The ABS in an irregular survey of Business management services in 1992-93 estimated that public relations consulting services accounted for 23 per cent of total income from business management consulting services (*Selected Business Services, 1992-93*, Cat. no. 8677.0, table 14.1). In the absence of additional data, for each year of the series only 77 per cent of the total income from Business management services has been counted as management consulting. The assumption of a constant share may lead to the adjusted estimate in any given year being understated or overstated.

No adjustment has been possible for some differences in the scope of this measure compared with the studies for the United States and United Kingdom.

- ANZSIC 7855 Business management services includes environmental consultancies, which are not included in the US estimate of organisational capital.<sup>50</sup> This means that the Australian estimate is likely to be overstated compared with that of the United States. And this overstatement may have grown over time if environmental consultancies have increased as a share of total business management services. However, it has not been possible to make any adjustment for this overstatement.

---

<sup>47</sup> Insufficient data were available to make any adjustment for any difference between exports and imports of these services. The estimates implicitly assumes net exports are zero — if net exports are positive (negative) then the estimates will be overstated (understated).

<sup>48</sup> This share was smoothed using a 3-period moving average to remove volatility.

<sup>49</sup> Intermediate usage data from IO tables for a broader group of services (Legal, accounting, marketing and business management services) were examined but the series was quite volatile — partly due to changes in classifications over time. The ABS cautions against using such data as a time series.

<sup>50</sup> It is unclear if environmental consultancies are included in the UK estimates.

- 
- MH (2006) adjust the UK estimate to exclude subcontracting of smaller consulting firms to larger consulting firms. Insufficient data are available to make any adjustment to the Australian data and this may result in an overstatement of organisational capital.

The resulting Australian series shows considerable growth in the management consulting industry (around 24 per cent a year between 1974-75 and 2005-06), particularly in the 1980s (30 per cent) and from the mid to late 1990s (around 20 per cent). There are few data sources against which to validate the estimates — however, there are some references to size and growth of the industry in particular years that suggest the estimates in this paper are plausible (putting aside issues of comparability of scope with the overseas estimates).

- It has been generally reported that growth in the management consulting industry has been high globally (see, for example, Wooldridge 1997; Gowen 1999). Kitay and Wright (1999, p. 7) estimated that the number of consulting businesses in Sydney and Melbourne (as listed in the yellow pages) grew nearly four-fold between 1978 and 1998. They also acknowledged that while estimates of the overall size of the Australian consulting market varied wildly, several studies had suggested growth of 25 per cent a year. Wright (2000, p. 99) refers to dramatic growth in the 1980s in the Australian management consulting industry as being fuelled by fundamental economic and technological changes. Kitay and Wright (2003, p. 22) note that the Australian consulting industry grew rapidly in the 1990s as was the case worldwide.
- Gowen (1999, p. 33) estimated the size of the management consulting industry to be \$5-\$6 billion in 1996, although she acknowledges that it is likely this may include non-consulting revenue. Allen (1990) reported the annual turnover of the Australian market and business consultancy industry as \$1.3 billion in 1990. Wright (2000, pp. 100–1) cited data for the leading firms that suggests total turnover was \$0.5 billion in 1985.<sup>51</sup> The estimates based on the backcasting method described above are broadly in line with these estimates at \$5.1 billion for 1995-96, \$1.5 billion for 1989-90 and \$0.4 billion for 1984-85.<sup>52</sup>

---

<sup>51</sup> This is based on the reported turnover of leading firms of \$104 million in 1985 and the assumption that the reported share of these firms in the late 1980s (20 per cent) also applied in 1985.

<sup>52</sup> Estimates of business management services after deducting estimated public relations consultancies (and before scaling down to market sector usage).

---

### *Investment series*

In line with CHS (2005), 80 per cent of the expenditure series is used to represent investment. No adjustment was made for any overlap with own account organisational capital (for the same reasons as noted by CHS above).

The investment series was deflated by the implied market sector GVA deflator.

### *Capital series*

The capital stock series was constructed using PIM, as described in chapter 4, with an assumed depreciation rate of 40 per cent. This is in line with CHS (2006, pp. 23) — an average of the rates used for brand equity and R&D. CHS (2006, p. 24) justify this as follows

Investments through strategic planning and reorganization reflect business' need to constantly adapt to changing economic conditions. While such investments undoubtedly have a long-lasting “learning-by-doing” dimension (similar to that in R&D), we believe they also have a short-lived “organizational forgetting” dimension (similar to that in advertising).

### *Own account*

CHS (2005, table 1.3) estimate the own account component of organisational capital as 20 per cent of the value of executive time using US Bureau of Labor Statistics (BLS) data on employment and wages in executive occupations. MH (2006, p. 13) use a similar approach but exclude ICT managers (to avoid double counting with capitalised software) and self-employed (who they indicate they do not believe built organisational capital in the same way as in other industries). The definition of managers appears to be relatively broad (not just, for example, CEOs), although it has not been possible to compare the specific occupational groups used.

It should be noted that percentage of executives' time spent building organisational capital is likely to have changed over time and to vary across countries — the use of a constant 20 per cent of executive time may therefore be a source of mismeasurement. For example, Fukao et al. (2008a) cite a 2006 study that estimated that Japanese CEOs spent only 9 per cent of their time on activities related to building organisational capital. But he also noted that some Japanese firms have divisions specialising in these activities, although there are no data about their expenditure. As Fukao notes, a new survey is probably needed to obtain better measures of organisational capital.

---

### *Expenditure series*

The own account portion of organisational capital is estimated from average earnings of managers and the number of managers in the market sector.

The specific occupation group used was Managers & administrators (ASCO 1) excluding, where possible, both IT managers (ASCO 1224) and Farmers & farm managers (ASCO 13).<sup>53</sup> The exclusions of IT managers was based on the reasoning used by MH (2006) — avoiding double counting with IT capital. It was possible to exclude the self-employed (owner-managers of unincorporated enterprises<sup>54</sup>), as done by MH (2006), because the ABS survey used excluded this group. The additional exclusion of Farmers & farm managers has been made on the basis that this subgroup is considerably different from the other managers and would not be expected to build organisational capital in the same way.

Data on average weekly earnings and number of Managers & administrators were available from the *Employee Earnings, Benefits and Trade Union Membership* (EEBTUM) survey (ABS Cat. no. 6310.0) (a supplement to the August Labour Force Survey). Weekly earnings are defined in this survey as the amount of ‘last total pay’ (that is, before taxation and other deductions have been made).<sup>55</sup> The average earnings are calculated excluding those employees who did not draw a wage or salary, that is, people working in their own incorporated enterprises.

Unpublished data on earnings and employee numbers from Cat. no. 6310.0 were available for Managers & administrators excluding IT managers and farmers in the market sector annually for August 1997 to August 2006. These August observations were used for the financial years 1997-98 to 2006-07. The number of employees obtained includes persons who receive a wage or salary or persons who operate their own incorporated enterprises. Using this number of employees to obtain the wages bill, implicitly assumes the value for own account organisational capital

---

<sup>53</sup> *Australian Standard Classification of Occupations (ASCO), Second edition, 1997* (ABS Cat. no. 1222.0) has been used or the closest available occupation from the earlier occupational classifications, ASCO 1<sup>st</sup> edition and Classification and Classified List of Occupations (CCLO). It has not been possible to compare the scope of Managers and administrators in this classification with the ‘executive’ occupations used in the US and UK papers.

<sup>54</sup> Owner-managers of incorporated enterprises are included.

<sup>55</sup> No adjustment is made for any back payment of wage increases, prepayment of leave, or bonuses, etc. No explicit reference to the treatment of salary sacrifice amounts years is made in the survey questions, and the ABS considers it probable that some respondents are already including amounts salary sacrificed in their responses, depending upon how their pay is reported. (See *Changes to ABS Measures of Employee Remuneration, 2006*, ABS Cat. no. 6313.0, p. 31 for further details).

---

investment for owner-managers equal to the average earnings of Managers & administrators drawing a wage or salary.

Prior to 1997 data were only available from the annual publication of Cat. no. 6310.0.<sup>56</sup> This provided data for the total economy for Managers & administrators numbers and average weekly earnings but insufficient data to calculate market sector estimates. The EEBTUM Employee numbers were backcast using growth in a series constructed from Labour Force Survey (LFS) data for all Managers and administrators (not just employees) in an approximated market sector (excluding Agriculture).<sup>57</sup>

Average weekly earnings were also backcast using growth in the closest available series to Managers and administrators (or the closest occupational classification) in the market sector (less Agriculture). From 1988 to 1996, the closest series was average weekly earnings of Managers and administrators (ASCO1) for the total economy. Prior to this, it was full-time managers for the total economy (Manager & administrators ASCO1/Administrative, executive and managerial employees CCLO). It was not possible to apply any industry or occupational concordance to these dollar averages. The implicit assumption is therefore that growth in these wages was representative of the ASCO2 Managers & administrators group of interest. The use of full-time average weekly earnings growth for the earlier period also assumes a constant share of part-time workers, that part-time workers work constant hours and that part-time wages are proportional to full-time wages according to hours worked. The share of part-time workers among Managers & administrators increased from 4 per cent in 1975 to 6 per cent in 1985<sup>58</sup> so is unlikely to represent a major distortion. The EEBTUM survey (Cat. no. 6310.0) commenced in 1975, so the August 1974 estimate (used for 1974-75) was derived using growth in Managers & administrators total employed from the Labour Force

---

<sup>56</sup> No survey was conducted in 1996. No publication was produced in 1995 and the electronic data file is no longer available. Data for these years are interpolated on a linear trend between 1994 and 1997 data.

<sup>57</sup> Employed Managers & administrators by industry were taken from ABS 6291.0.55.003 EO9\_aug 86 back to 1986-87 and from LFS microfiche back to 1974-75 (the ASIC to ANZSIC industry concordance used in Gretton and Fisher 1997 was applied to the latter industry numbers to construct a market sector estimate). Growth in each segment of this series was spliced together as there were also two breaks in the series due to changes in occupational classification — from CCLO to ASCO1 in 1986 and to ASCO2 in 1996. The closest occupational classification to ASCO2 Managers and administrators was used in each case — CCLO Administrative, executive and managerial and ASCO1 Managers and administrators (with ASCO 1st edition having a different definitions of Managers & administrators).

<sup>58</sup> From ABS *Labour Force Historical Timeseries, Australia, 1966 to 1984* (Cat. no. 6204.0.55.001).

---

Survey for the number of employees and average weekly earnings estimated assuming the growth rates between 1975 and 1976.

From these employee number series and average weekly earnings series, the total wages bill was calculated as the number of employees multiplied by average weekly earnings multiplied by 52 weeks. As noted above, this number of employees excludes owner-managers of unincorporated enterprises. This may lead to an underestimate of own-account organisational capital if this group does invest in this intangible in the same way as other Managers & administrators.

Twenty per cent of this wages bill was counted as expenditure on own account organisational capital. CHS (2005, p. 30) note that their assumption that managers spend 20 per cent of their time investing in organisational development is arbitrary. However, for the purposes of comparability and in the absence of alternative estimates of time spent, the same percentage is used in this paper.

#### *Investment series*

No further adjustments were made to the nominal expenditure to obtain nominal investment.

The series was deflated by the implied market sector gross value added deflator.

#### *Capital series*

The capital stock series was constructed using PIM, as described in chapter 4, with an assumed depreciation rate of 40 per cent. This depreciation rate was selected for the same reasons as described under purchased organisational capital above.

## **A.4 Comparison of data sources with other studies**

As discussed in chapter 6, the various country studies do not measure intangibles for the same group of industries in each case — the market sector for Australia and the United Kingdom (but the UK market sector is much broader than that for Australia); the non-farm business sector for the United States; the non-financial business sector for Finland; and the whole economy for the Netherlands and Japan.

If the rates of investment in intangibles differ across industries, the average rate will be affected by the differences in industry coverage across countries. For example, the Australian market sector is defined more narrowly than the UK market sector, which includes additional industries such as property and business services and

---

private education and health. Higher than average rates of investment in intangibles in these additional industries would increase the UK market sector average compared with a more narrowly defined market sector. Differences between the rate of intangible investment in the United Kingdom and Australia could therefore be due to differences in industry coverage of the measure, rather than actual differences between the countries at the industry level. However, it has not been possible to adjust for this possible source of bias and determine if this is the case.

Table A.3 summarises details of the proxies and sources used in other studies (for the sector of the economy as listed above) and compares them with the Australian sources used.

**Table A.3 Comparison of data sources across countries**

<i>Category of intangible</i>	<i>Sources from other studies</i>	<i>Australian sources</i>
<i>Computerised information</i>		
Computer software	<p><i>US:</i> Own use, purchased and custom software from National Income and Product Accounts (NIPA).</p> <p><i>UK:</i> Own use, purchased and custom software from Office for National Statistics (ONS) estimates.</p> <p><i>Japan:</i> Data from Japan Industrial Productivity (JIP) database, compiled from IO tables and other surveys.</p> <p><i>Finland:</i> National accounts computer software series for the non-financial business sector.</p> <p><i>Netherlands:</i> National accounts (purchases and own account).</p> <p><i>France:</i> France National Institute of Statistics and Economic Studies, (purchased from SU tables and annual business surveys on software publishers; own account from labour costs of computer specialists).</p> <p><i>Germany, Italy and Spain:</i> EU KLEMS database software investment.</p> <p><i>Canada:</i> National accounts (purchases and own account).</p>	<p>Purchased and own-account (but only includes software developed in-house if expenditure is large) from ABS national accounts.</p>

(continued on next page)

Table A.3 (continued)

Category of intangible	Sources from other studies	Australian sources
Computer databases	<p>US: own use captured in NIPA software measures. Purchased component estimated from Services Annual Survey (subscription revenue from database and directory publishing industry).</p> <p>UK: Included in software estimates.</p> <p>Japan: Sales data for information service industry.</p> <p>Finland: Included in software estimates.</p> <p>Netherlands: Included in software estimates.</p> <p>France, Germany, Italy and Spain: EU KLEMS database gross output of database activities industry.</p> <p>Canada: Purchased from Survey of Software Development and Computer Services. Own account included in software estimates.</p>	<p>Large expenditures on purchase, development or extension of databases from ABS national accounts. Included in computer software estimates.</p>

*Innovative property*

Scientific R&D

*US:* Mainly R&D in manufacturing, software publishing and telecom industries. National Science Foundation Census.

Current expenditure by business on R&D from Shanks and Zheng (2006) R&D database, updated from ABS survey of BERD. R&D by financial services industry deducted.

*UK:* current expenditure on R&D from BERD. R&D in computer industry subtracted (to avoid double counting with software; still leaves in possible double counting of tangible capital expenditure on R&D by using current and capital expenditure on R&D).

*Japan:* Expenses on materials and labour costs on R&D activities from Survey on R&D.

*Finland:* BERD (compiled according to OECD Frascati manual guidelines) adjusted for a number of factors including acquisition of R&D, imports and exports.

*Netherlands:* Current expenditure on R&D based on R&D survey (compiled according to the Frascati manual) but translated to R&D use according to national account conventions. Excludes government consumption of R&D and market R&D use in the R&D- and universities industry.

*France, Germany, Italy and Spain:* EUROSTAT R&D expenses for natural science and social science, excluding software. Excludes government and higher education sector.

*Canada:* BERD survey for manufacturing, utilities, construction and agriculture.

---

(continued on next page)

Table A.3 (continued)

Category of intangible	Sources from other studies	Australian sources
Mineral exploration	<p>US: Mineral exploration in Census of Mineral Industries and National Income and Product Accounts; R&amp;D in mining industries from Census of Mineral Industries.</p> <p>UK: National accounts.</p> <p>Japan: Estimated from Handbook of the Mining Industry and Annual Report on Natural Gas.</p> <p>Finland: National accounts.</p> <p>Netherlands: National accounts.</p> <p>France, Germany, Italy and Spain: Derived from exploration costs in the North Sea.</p> <p>Canada: BERD survey for R&amp;D of Mining, oil and gas extraction industry and Annual survey of service industries surveying and mapping for other geophysical and geological exploration.</p>	Mineral exploration from ABS national accounts.

Copyright and  
licence costs

*US:* Mainly R&D in information sector industries (except software publishing) — proxied by development costs in motion picture industry from industry association plus double new product development costs for motion pictures as crude proxy for development costs in radio, TV, sound recording and book publishing industries.

*UK:* National accounts (SNA93).

*Japan:* JIP database (nominal output of publishing and newspaper industry and video picture, sound info, character information production and distribution industry).

*Finland:* National accounts (SNA93).

*Netherlands:* National accounts.

*France, Germany, Italy and Spain:* Development costs of motion pictures from Screen Digest plus double these costs to proxy for development costs in radio, TV, sound recording and book publishing.

*Canada:* R&D of information and cultural industries.

---

Artistic originals (SNA93) from ABS national accounts.

(continued on next page)

Table A.3 (continued)

Category of intangible	Sources from other studies	Australian sources
Other product development, design and research		
New product development costs in the financial industry	<p><i>US:</i> 20 per cent of all intermediate purchases by Financial services industry. (US SIC 60-62, 67, includes services to finance but not insurance).</p> <p><i>UK:</i> 20 per cent of all intermediate purchases by Financial services industry (intermediate purchases reduced by purchases of advertising, software, consulting and design). (UK SIC 65, 67, includes services to finance but not insurance).</p> <p><i>Japan:</i> 20 per cent of all intermediate purchases by Financial industry and Insurance industry.</p> <p><i>Finland:</i> Not included because intangibles measured for the non-financial business sector.</p> <p><i>Netherlands:</i> Assumed to be included in Scientific R&amp;D.</p> <p><i>France, Germany, Italy and Spain:</i> 20 per cent of intermediate inputs of financial industry from OECD STAN database, adjusted to avoid double counting of inputs counted elsewhere.</p> <p><i>Canada:</i> BERD survey of finance sector.</p>	<p>20 per cent of total intermediate usage by Finance industry (ANZSIC 380 and share of ANZSIC 400) from ABS Input-output/Supply-use tables.</p>

New architectural and engineering designs

*US:* Half of total turnover of architecture and design industry.

*UK:* Half of total turnover of architecture and design industry (turnover reduced by purchases of advertising, software and consulting).

*Japan:* Output data of the design, display, and machinery design industries from the input-output tables for new architectural design and data from Survey of Selected Service Industries for investment in engineering design.

*Finland:* Already included in tangible investments, so deducted and separately identified.

*Netherlands:* National accounts. Intermediate input of these designs in the production of capital goods. Investments are two-thirds of this value.

*France, Germany, Italy and Spain:* 50 per cent of gross output of Architectural, engineering and other technical activities industry from EU KLEMS database, excluding inputs counted elsewhere.

*Canada:* BERD survey of architectural and engineering services.

Half of revenue from architectural and engineering industries (ANZSIC 7821 and 7823) from ABS industry surveys.

---

(continued on next page)

Table A.3 (continued)

Category of intangible	Sources from other studies	Australian sources
R&D in social science and humanities	<p>UK/US: Twice industry revenues of social science and humanities R&amp;D industry (uses twice as way of estimating own account spending).</p> <p>Japan: no suitable data available.</p> <p>Finland: Included under Scientific R&amp;D.</p> <p>Netherlands: Included under Scientific R&amp;D.</p> <p>France, Germany, Italy and Spain: Included under Scientific R&amp;D.</p> <p>Canada: .BERD survey of remaining service industries not included elsewhere.</p>	Included under Scientific R&D.

*Economic competencies*

Brand equity

Advertising  
expenditure

*US:* 60 per cent of Grand total by type of advertiser as reported by Universal-McCann.

60 per cent of total advertising expenditure, excluding classifieds and directories, from CEASA industry survey association. Doubled to estimate allow for production costs.

*UK:* 60 per cent of total spending on advertising reported by Advertising Association, less expenditure on classified ads.

*Japan:* 60 per cent of nominal output of advertising industry purchased by other industries.

*Finland:* Included in marketing expenditure.

*Netherlands:* Expenditure according to National accounts, on marketing and advertisement, excluding spending by advertising agencies. Further exclusions, based on industry and type of advertisement, to arrive at estimates of capital spending.

*France, Germany, Italy and Spain:* 60 per cent of gross output of advertising industry (excluding classified ads) from EU KLEMS database.

*Canada:* 60 per cent of revenue from Annual Survey of Advertising and Related Services.

---

(continued on next page)

Table A.3 (continued)

Category of intangible	Sources from other studies	Australian sources
Market research	<p><i>US:</i> Twice revenues of the market and consumer research industry as reported in Services Annual Survey.</p> <p><i>UK:</i> Twice revenues of the market and consumer research industry as reported in Annual Business Inquiry. (Twice as estimate of own account spending).</p> <p><i>Japan:</i> not separately measured.</p> <p><i>Finland:</i> Purchased marketing expenditures from business register data for 1999-2005.</p> <p><i>Netherlands:</i> Purchased market research based on national accounts data series concerning total production and purchases of economic advice as well as more detailed microdata.</p> <p><i>France, Germany, Italy and Spain:</i> Twice turnover of Market research and public opinion polling industry from Structural Business Statistics of EUROSTAT.</p> <p><i>Canada:</i> Twice revenue of market research industry from Datamonitor survey (excluding public sector).</p>	<p>Twice revenue of ANZSIC 7853 Market research services from ABS industry surveys.</p>

<p>Firm-specific human capital</p>	<p><i>US:</i> BLS surveys of employer-provided training in 1994 and 1995. Includes direct firm expenses (inhouse trainers, outside trainers, tuition reimbursement and outside training funds); and wage and salary costs of employee time in formal and informal training.</p> <p><i>UK:</i> National Employer Skills Survey 2005, similar survey of employer-provided training adjusted to consider private sector expenditure and all UK.</p> <p><i>Japan:</i> As for US, using data on vocational education costs per worker from the General Survey of Working Conditions and opportunity cost data from Survey of Personnel Restructuring and Vocational Education/Training Investment in the Age of Performance-based Wage Systems.</p> <p><i>Finland:</i> Direct firm expenses and wage and salary costs from Continuing Vocational Training Survey for 1999.</p> <p><i>Netherlands:</i> Direct firm expenses and wage and salary costs from Continuing Vocational Training Survey for most industries; other survey data and annual reports for missing industries.</p> <p><i>France, Germany, Italy and Spain:</i> Continuing Vocational Training Survey and Labour Cost Survey from EUROSTAT and labour compensations from EU KLEMS database.</p> <p><i>Canada:</i> Direct training expenses per employee from Conference Board of Canada and employment data from Labour Force Survey of Statistics Canada. Doubled to proxy wage and salary costs of employee time.</p>	<p>Cost of employer-provided training and wage and salary costs of employee time undertaking training from ABS training surveys.</p>
------------------------------------	--	--

(continued on next page)

Table A.3 (continued)

Category of intangible	Sources from other studies	Australian sources
Organisational capital		
Purchased	<p>US: 80 per cent of estimate using Services Annual Survey data on the revenues of the management consulting industry.</p> <p>UK: 80 per cent of revenue of management consulting industry from Management Consulting Association (Private sector expenditure only).</p> <p>Japan: Nominal output of law firms and accounting offices from input-output tables.</p> <p>Finland: Nominal gross output in business and management consultancy activities.</p> <p>Netherlands: Based on National accounts data series concerning total production and purchases of economic advice as well as more detailed microdata.</p> <p>France, Germany, Italy and Spain: Revenue of the management consulting industry survey by the European Federation of Management Consultancies Associations (excluding public sector spending).</p> <p>Canada: 80 per cent of revenue of Management, scientific and technical consulting services.</p>	<p>80 per cent of revenue of 77 per cent of ANZSIC 7855 business management services from ABS Industry survey.</p>

Own account	<p><i>US</i>: 20 per cent of value of executive time using BLS data on employment and wages in executive occupations.</p> <p><i>UK</i>: 20 per cent of value of executive time using Annual Survey Hours and Earnings data on employment and wages in executive occupations, excluding software occupations.</p> <p><i>Japan</i>: 20 per cent of salaries and bonuses for executives from the Survey of Financial Statements of Business Enterprises.</p> <p><i>Finland</i>: 20 per cent of value of management personnel time from Structure of Earnings statistics.</p> <p><i>Netherlands</i>: 20 per cent of value of executive time using labour force data on wages in managerial occupations (based on German data on the difference between average earnings in management occupations and all occupations).</p> <p><i>France, Germany, Italy and Spain</i>: 80 per cent of 20 per cent of compensation of Legislators, senior officials and managers derived from the EU KLEMS database and Structure of Earnings Survey by EUROSTAT.</p> <p><i>Canada</i>: 20 per cent of wages bill of senior management occupations from the census of population.</p>	<p>20 per cent of value of Managers &amp; administrators (less IT and farm managers) time using data on employment and wages from ABS labour force survey.</p>
-------------	---	--

---

Sources: Corrado, Hulten and Sichel (2005); Marrano and Haskel (2006); Fukao et al. (2008b); Jalava, Aulin-Ahmavaara and Alanen (2007); van Rooijen-Horsten et al. (2008); Belhocine (2008); Hao, Manole and van Ark (2008); author's estimates.