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Updating investment estimates for Australia's organisational capital

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Abstract

Organisational capital refers broadly to internal practices, processes and systems that enable firms to generate value. This paper presents an updated experimental estimate of organisational capital in the Australian market sector, derived using the standard expenditure approach for measuring intangible capital. We find that business investment in organisational capital in Australia is significant and fast growing. The relative share of organisational capital stock increased dramatically during the 1990s when compared to physical capital, but has since been gradually retreating over the last decade or so. This pattern appears to reflect similar trends in business function outsourcing and the uptake of enabling technologies over the same period.

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Key points

- Studies suggest that superior business performance is often associated with investment in a range of intangible assets, including organisational capital. Organisational capital refers to the systems, processes and practices, embedded within an organisation.
- It is estimated that in the year to June 2013, for every \$1 Australian market sector businesses invested in machinery and equipment, they invested an additional 30 cents in organisational capital. The proportion of this particular type of investment, relative to physical capital investment, increased dramatically during the 1990s but has since been gradually retreating.
- In total, Australian market sector businesses spent some \$21 billion on organisational capital in the 2013 financial year. While this spending was reported as current expenditures it may be better viewed as investment, insofar as it was made in the expectation of a future return. The accumulated stock of organisational capital in the market sector was around \$46 billion as at June 2013.
- Literature suggests that organisational capital investment across OECD countries is significant and fast growing. We estimate that over the 23 years to June 2013, Australian market sector investment in organisational capital grew on average by 11.6 per cent per year, which exceeds the 10.9 per cent growth in machinery and equipment investment and the 5.8 per cent growth in market sector gross value added.
- Organisational capital is conceptually linked to management practices and capabilities. Our cursory cross-country comparison suggests that, in terms of its business investment in organisational capital as a share of value added, Australia is essentially a mid-range performer.

1. Introduction

There is growing interest in the economic and business literature in the role of intangible capital in improving and maintaining business performance and economic growth. Investment in intangible capital broadly refers to any monetary outlays firms make with the expectation of a future return which are not immediately embodied in machinery, equipment and buildings, and any other forms of physical capital.¹ The most widely adopted analytical framework for estimating intangible capital was first introduced and subsequently developed by Corrado et al.²

The focus of this paper is organisational capital (OC), which is a particular form of intangible capital that is part of a broader universe of intangible assets. OC is one of several so-called 'new intangibles' which are at present reported as current expenditures rather than investment under current accounting standards and in the system of national accounts. In many countries, including Australia, OC is arguably one of the most significant forms of intangible capital in terms of investment size and the rate of growth.³ Studies that estimate the size of OC investment (and other new intangibles) generally find that it is significant and fast growing.⁴ It is also among the least-well understood, least-well measured and least-well reported intangibles.⁵

Corrado et al.⁶ articulate the conceptual basis for capitalising intangible investments that have traditionally been treated as expenditures and set out the basic framework for measurement. This framework is widely referred to as CHS. Organisational capital belongs to the subset of intangible capital, known as economic competencies. It is further divided into two components: own account investment (or stock) and purchased investment (or stock). For an individual firm, own account investment refers to the cost of managerial time allocated to improving the functioning of that organisation over a given period, while purchased investment is the cost of any consulting services relevant to improving the functioning of the organisation. Past investments accumulate to

¹ Hunter L, Webster E & Wyatt A (2005) Measuring intangible capital: a review of current practice, *Australian Accounting Review*, 15, 36, pp. 4–21

² Corrado C, Hulten C & Sichel D (2005) Measuring capital and technology: an expanded framework, *Measuring capital in the new economy*, pp. 11–46, University of Chicago Press; Corrado C, Hulten C & Sichel D (2006) *Intangible Capital and Economic Growth*, Federal Reserve Board, Washington

³ Haskel J (2012) *Growth, Innovation and Intangible Investment*, London School of Economics Growth Commission

⁴ For example, Tronconi C & Vittucci Marzetti G (2009) *Organizational Capital and Firm Performance: Empirical Evidence for European Firms*, University of Trento; Barnes P & McClure A (2009) *Investments in intangible assets and Australia's productivity growth*, Productivity Commission; de Rassenfosse G (2012) *Intangible assets and productivity growth-an update*, Melbourne Institute of Applied Economic and Social Research University of Melbourne, commissioned by the Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE)

⁵ Barnes P & McClure A (2009) op cit.; Hunter L, Webster E & Wyatt A (2005) op cit.

⁶ Corrado C, Hulten C & Sichel D (2005) op cit.

form the firm's OC stock and this stock is assumed to depreciate quickly. Investments and stocks can be added up across businesses and industries to get an estimate of the overall levels of OC in the economy.

OC has been variously defined in literature. For instance, Lev and Radhakrishnan⁷ define it as 'the agglomeration of technologies — business practices, processes and designs, including incentive and compensation systems — that enable some firms to consistently extract out of a given level of resources a higher level of product and at lower cost than other firms'. Webster and Jensen⁸ define it more succinctly as 'the organisational architecture and the systems for monitoring activity and communicating within the firm'.

Of all the intangibles, OC is perhaps most directly associated with management practices and capabilities. A brief survey of Australian business management literature highlights the role of OC in the context of managerial capabilities. Green and Agarwal⁹ benchmarked a sample of medium and large Australian manufacturing businesses against a composite management score indicator (developed by the authors) and found that a single point increase in this indicator was associated with an increase in output equivalent to a 56 per cent increase in the labour force or a 44 per cent increase in invested capital.¹⁰ Another Australian study found that the presence of OC-related intangibles was associated with an additional 12 cents in sales revenue for every \$1 invested and nearly three-fold profit margins compared to the low-performing firms in the sample.¹¹

A recent Ai Group report titled *Assessing Leadership in Australia* refers to the decline in Australia's ranking in terms of leadership and management performance. Drawing on survey evidence, the report identifies the key barriers to improvement to be: organisational cultures, short-term focus on financial

⁷ Lev B & Radhakrishnan S (2003) The measurement of firm-specific organization capital, National Bureau of Economic Research

⁸ Webster E & Jensen PH (2006) Investment in Intangible Capital: An Enterprise Perspective, *The Economic Record*, 82, 256, pp. 82–96

⁹ Green R & Agarwal R (2009) *Management matters in Australia*, Department of Innovation, Industry, Science and Research, Canberra

¹⁰ The results are based on a qualitative survey of 439 medium and large-sized manufacturing firms in Australia, with an extension to a smaller sample of services firms. These firms were contacted in early 2009 and taken through a structured conversational interview to examine their management practices across 18 different dimensions, corresponding to three categories of management capability: people, performance and operations. A single point in the management score refers to a point as per authors' scoring grid, wherein improvements in any or all of the 18 identified management dimensions can help achieve a one point increase in the overall management score.

¹¹ Boedker C, Vidgen R, Meagher K, Cogin J, Mouritsen J & Runnalls M (2011) Leadership, culture and management practices of high performing workplaces in Australia: The high performing workplaces index, University of New South Wales, Australian School of Business

performance and excessive emphasis on individual development without consideration of collective capability.¹²

It is commonly assumed that the managerial intent of OC investment is the enhancement of firm value. In the case of publicly traded firms which have observable market prices, OC contributes to the difference between a firm's market value relative to its book value.¹³ For non-listed firms the only way to estimate the size of OC is to try to measure it directly. However, due in part to a lack of common measurement standards and accounting conservatism, this investment is erroneously reported as current expenditures.¹⁴

The goal of this paper is to update the estimates of Australia's aggregate market sector OC investment and stock. As with previous estimates, our estimates are *experimental* and come with a range of methodological and conceptual caveats (see methodology at Appendix A). We additionally modify our estimates of *own account* OC to remove some assumptions that were necessary in previous Australian studies. The modification does not have a material impact on the estimated growth rate of OC but it does increase the size of OC investment and stock compared to previous studies. In this paper we quote our modified estimates as our current best estimates and provide a descriptive analysis to highlight some of the key characteristics.

¹² Ai (Australian Industry) Group (2015) *Addressing Enterprise Leadership in Australia*, http://www.leadershiprevolution.com.au/wp-content/uploads/2015/06/AI_GROUP_LEADERSHIP_POLICY_JUNE_2015.pdf

¹³ Pablos 2003 as cited in Hunter L, Webster E & Wyatt A (2005) *op cit.*

¹⁴ Hunter L, Webster E & Wyatt A (2005) *op cit.*; Le Mouel M and Squicciarini M (2015) Cross-Country Estimates of Employment and Investment in Organisational Capital: A Task-Based Methodology Using PIAAC Data, *OECD Science, Technology and Industry Working Papers*, 2015/08, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5jrs3smfqcjb-en>

Box 1.1: A common framework for intangible capital measurement

The framework distinguishes between three basic categories of intangible assets:

Computerised information — reflects knowledge embedded in computer software and computerised databases. Both these are now capitalised in Australian national accounts statistics under the label 'Computer software'.¹⁵

Innovative property — includes traditional scientific research and development (R&D) as well as a variety of other types of R&D. Non-scientific R&D encompasses scientific knowledge embedded in patents, licenses, and general know-how (not patented). It also includes the innovative and artistic content in commercial copyrights, licenses, and designs (such as new architectural and engineering designs), as well as mineral exploration and financial industry innovation. Some of these intangibles are currently capitalised in Australian national accounts statistics¹⁶ under the labels 'Research and development'; 'Mineral and petroleum exploration' and 'Artistic originals'.

Economic competencies — refers to the value of brand names and other knowledge embedded in firm-specific human and structural resources. It is the accumulated value of past expenditures targeted as raising productivity and profits (excluding the software-related and R&D expenses classified elsewhere). The three basic asset types included in economic competencies are: brand names, firm-specific human capital, and organisational capital. These are currently not capitalised in Australian national accounts statistics.

See Appendix A for more detail

Source: Corrado C, Hulten C & Sichel D (2005) op cit.

2. Results

In this section we present our experimental estimates of OC investment and the notional accumulated net capital stock for Australia, benchmarked against corresponding measures of physical capital (defined narrowly as machinery and equipment) and gross value added. For context we also provide a brief international comparison. Unless otherwise stated, reported dollar values refer to the real (deflated) Australian dollars.

In producing our figures we follow the methodology of previous Australian studies by Barnes and McClure¹⁷ and de Rassenfosse¹⁸ — but we introduce a modification when estimating the *own account* component of OC. The modification, which uses data that was not available in previous studies, allows us to reduce the number of assumptions required to calculate the estimates (see Discussion and Methodology at Appendix A). Based on our descriptive analysis we present six findings.

¹⁵ Australian Bureau of Statistics (ABS) (2014) *Australian System of National Accounts*, Table 63. Net Capital Stock, by Industry by type of asset, Cat. No. 5204.0, ABS, Canberra

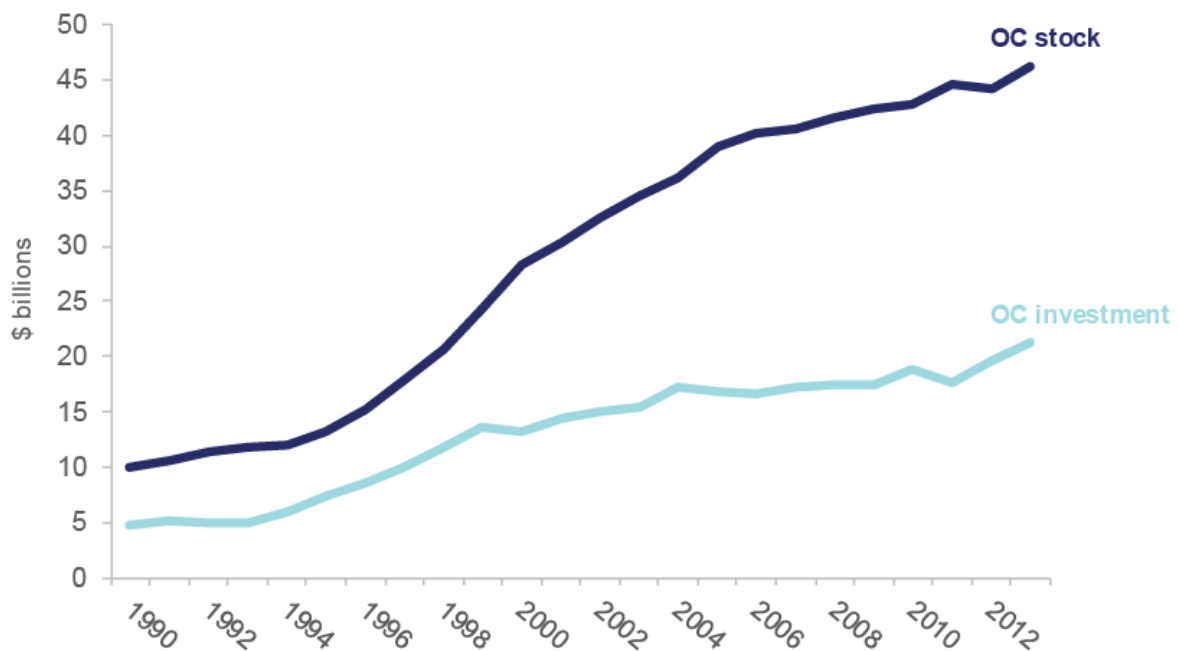
¹⁶ Ibid.

¹⁷ Barnes P & McClure A (2009) op cit.

¹⁸ de Rassenfosse G (2012) op cit.

First, our current best estimate is that total OC investment for the market sector was around \$21.2 billion during the year to June 2013, putting the corresponding notional accumulated net OC stock in the vicinity of \$46.1 billion as at June 2013 (Figure 2.1). As there is a perception that intangibles are relatively short-lived assets compared with physical capital, the assumed annual depreciation rate is 40 per cent, in line with the Corrado et al. methodology¹⁹ (see Appendix A).

Figure 2.1: Aggregate market sector OC investment and notional OC stock, 1989–90 to 2012–13



Notes: Authors' calculations of aggregate levels of OC investment and stock. See Appendix A.

Sources: Australian Bureau of Statistics (ABS) (2015) Counts of Australian Businesses, including Entries and Exits, Cat. No. 8165.0, ABS, Canberra; ABS (2015) Employee Earnings and Hours, Australia, Cat. No. 6306.0, ABS, Canberra; ABS (2015) Labour Force, Australia, Detailed, Quarterly, Cat. No. 6291.0.55.003, ABS, Canberra; ABS (2015) Estimates of Industry Multifactor Productivity, Cat. No. 5260.0.55.002, ABS, Canberra; ABS (2014) Employee Earnings, Benefits and Trade Union Membership, Australia, Cat. No. 6310.0, ABS, Canberra; ABS (2014) Australian System of National Accounts, Cat. No. 5204.0, ABS, Canberra; ABS (2013) Australian National Accounts: Input-Output Tables (Product Details), Cat. No. 5215.0.55.001, ABS, Canberra.

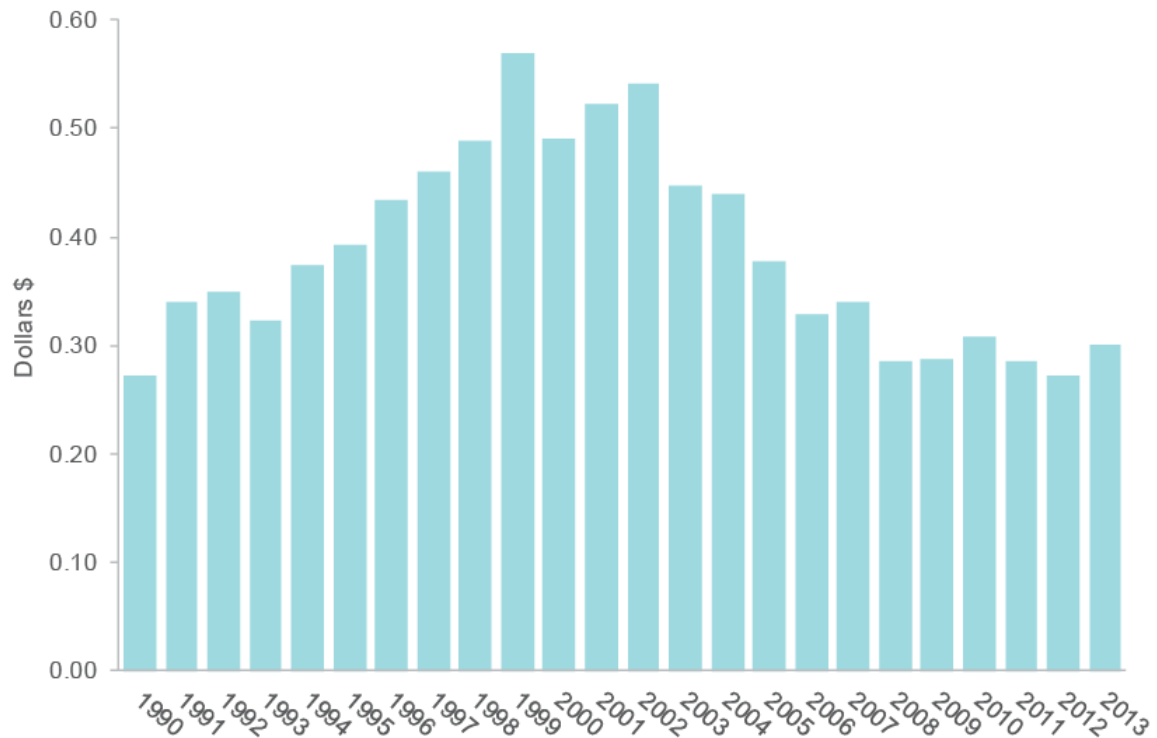
Second, for every \$1 businesses in the market sector invested in machinery and equipment in the year to June 2013, they invested around 30 cents into OC (Figure 2.2). We initially expected to find OC investment and investment in physical capital in a reasonably stable proportion. Instead what we found is an investment mix that changed dramatically over the period 1991–2000 with the ratio of OC investment to investment in machinery and equipment having essentially doubled compared to its initial level, but after 2002 it gradually started reverting back towards the proportions seen prior to the 1990s.

Our brief visual inspection of the data which make up the ratio (OC investment and physical capital investment) suggests that the increase during the 1990s

¹⁹ Corrado C, Hulten C & Sichel D (2005) op cit.

was driven primarily by changes in the numerator (OC investment) rather than the denominator (physical capital investment), and that the subsequent decline from 2002 may reflect a combination of slower growth in the numerator and somewhat faster growth in the denominator. The accelerated growth of physical capital investment from 2002 may in part reflect the boom in mining investment, which lifted investment spending by the mining sector from around two per cent of GDP to eight per cent, over the decade to 2012.²⁰

Figure 2.2: Investment mix: Aggregate market sector OC investment relative to aggregate market sector investment in machinery and equipment, 1989–90 to 2012–13



Notes: Authors' calculations of the relative proportion of OC investment to investment in machinery and equipment. See Appendix A.

Sources: ABS (2015) Cat. No. 8165.0 op cit.; ABS (2015) Cat. No. 5260.0.55.002 op cit.; ABS (2015) Cat. No. 6291.0.55.003 op cit.; ABS (2015) Cat. No. 6306.0 op cit.; ABS (2014) Cat. No. 6310.0 op cit.; ABS (2014) Cat. No. 5204.0 op cit.; and ABS (2013) Cat. No. 5215.0.55.001 op cit.

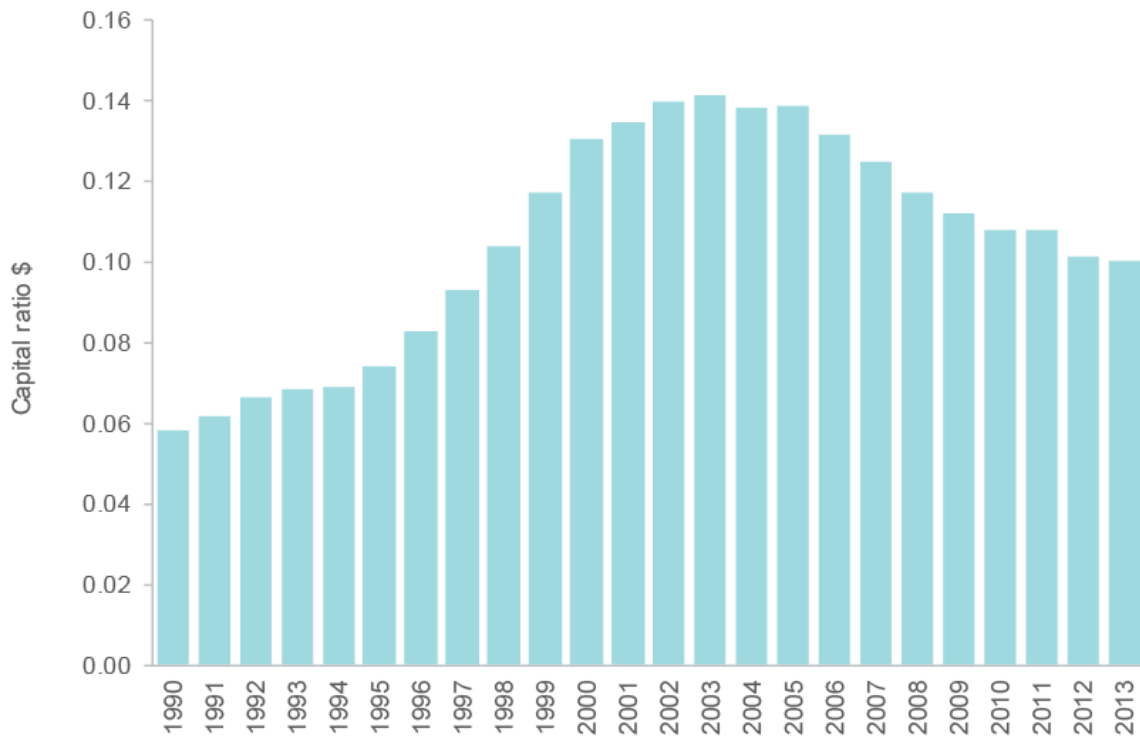
Third, in terms of capital structure, we estimate that for every \$1 of machinery and equipment available in the market sector in 2013, an additional 10 cents of OC stock is currently unaccounted for on Australian business balance sheets and in the national accounts (Figure 2.3).

The distinctive pattern of investment is also reflected in the capital structure. The smoothness of the data series reflects the stability from year to year of both the numerator (the capitalised net OC stock series) and the denominator (net machinery and equipment capital series). See Appendix A on how these data series were constructed. Another notable feature is the lasting change in the

²⁰ See, for example, Tulip P (2014) op cit.

capital structure, which seems to have persisted despite the gradual retreat of OC investment that followed the rapid period of growth during the 1990s. After peaking around 14 cents of OC stock per \$1 of machinery and equipment in 2003, a new capital structure can be observed with a somewhat higher (albeit declining) proportion of OC to machinery and equipment (Figure 2.3).²¹

Figure 2.3: Capital structure: Aggregate market sector net OC stock relative to aggregate market sector net stock of machinery and equipment, 1989–90 to 2012–13



Notes: Authors' calculations of the relative proportion of OC stock to the stock of equipment and machinery. See Appendix A.

Sources: ABS (2015) Cat. No. 8165.0 op cit.; ABS (2015) Cat. No. 5260.0.55.002 op cit.; ABS (2015) Cat. No. 6291.0.55.003 op cit.; ABS (2015) Cat. No. 6306.0 op cit.; ABS (2014) Cat. No. 6310.0 op cit.; ABS (2014) Cat. No. 5204.0 op cit.; and ABS (2013) Cat. No. 5215.0.55.001 op cit.

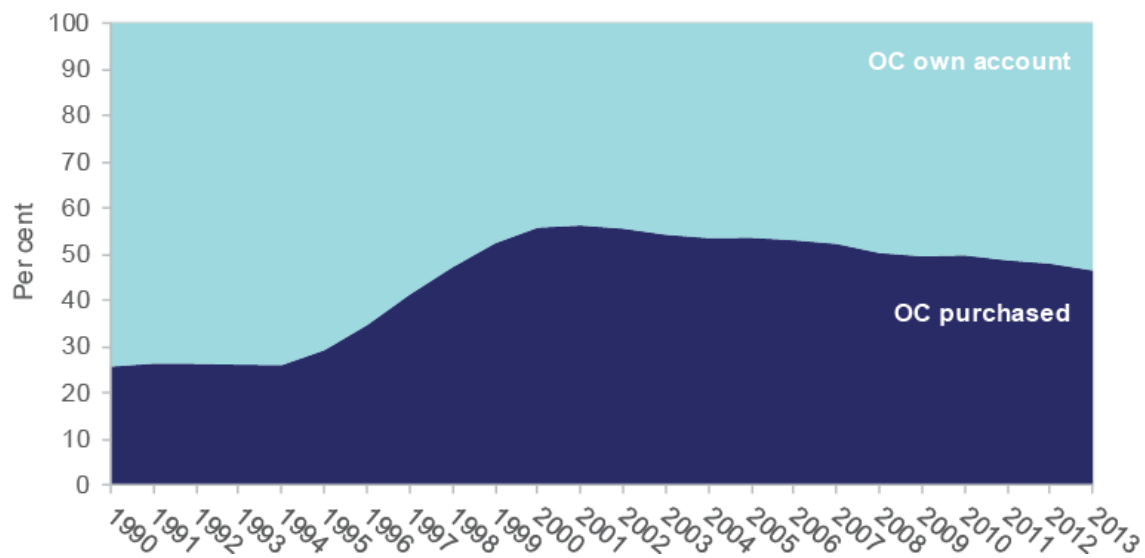
Fourth, we find that the average growth rate of OC investment slightly exceeds growth in physical capital. During the 23-year period from June 1990 to June 2013, aggregate investment into OC in the market sector grew by about 11.6 per cent per year, on average, which was marginally faster than growth in spending on machinery and equipment (10.9 per cent) and about double the growth rate of market sector GVA (5.8 per cent). This is consistent with the general shift towards a more service oriented economy, as we would expect service industries to be more reliant on intangibles, including OC.

²¹ As would be expected, there is a time lag between an investment increase (decline) and the corresponding increase (decline) in the relative capital stock.

Fifth, dividing OC stock into its two constituent parts (*own account* stock and *purchased* stock),²² we estimate that *own account* stock represents some 54 per cent of the total OC stock (\$24.7 billion) as at June 2013, with the remaining 46 per cent share (\$21.5 billion) being *purchased* stock.

The share of *purchased* stock of OC rose dramatically during the mid-to-late 1990s, increasing from 26 per cent in 1990 to 56 per cent at the turn of the century, but has been gradually retreating ever since (Figure 2.4). The timing of these changes is broadly consistent with the shifts in the investment mix and capital structure we saw earlier in Figure 2.2. Bringing all these threads together we get a sense of the scale of the transition of Australian businesses during the 1990s to a more organisationally intensive more outsourced capital structure — assisted primarily by the rapid introduction of new enabling technologies and services, and in particular ICT.²³

Figure 2.4: Breakdown of OC stock by source in the market sector over the period 1989–90 to 2012–13



Notes: Authors' calculations of the share of OC stock attributable to each of its two constituent components: *purchased* stock and *own account* stock. See Appendix A.

Sources: ABS (2015) Cat. No. 8165.0 op cit.; ABS (2015) Cat. No. 5260.0.55.002 op cit.; ABS (2015) Cat. No. 6291.0.55.003 op cit.; ABS (2015) Cat. No. 6306.0 op cit.; ABS (2014) Cat. No. 6310.0 op cit.; ABS (2014) Cat. No. 5204.0 op cit.; and ABS (2013) Cat. No. 5215.0.55.001 op cit.

Finally, the estimates can be put into perspective with a brief comparison to selected countries for which estimates are available (Figure 2.5). For the

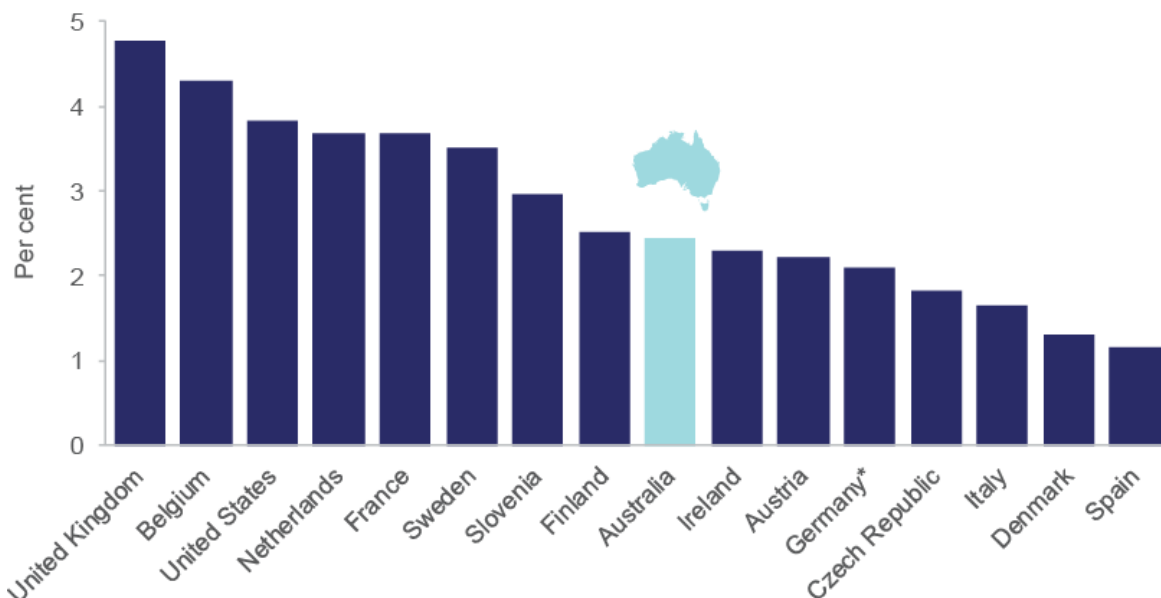
²² Own account OC refers to the investment in OC that is part of the internal business structure. It is generally measured by calculating the costs of managers who are the traditional sources of organisational capacity. Purchased OC refers to the investment in OC that has been bought by businesses. It is generally measured by calculating the costs of business management consulting services.

²³ Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) (2012) *Australian Innovation System Report 2012*, DIISRTE, Canberra

comparison, we used country estimates provided by Corrado et al.²⁴ on www.intan-invest.net and recast our estimates of OC as a share of GVA in the market sector in the year to June 2010. Caution is required when interpreting these estimates as we have not taken any additional steps beyond changing the reference year to harmonise our methodology with the comparator countries.

With that caveat in mind we estimate that as a share of GVA, Australia's OC investment was around 2.5 per cent and our OC stock around 5.6 per cent, which is in the same ballpark as Finland and Ireland. OC investment and stock relative to value added in the UK business sector were double that of Australia at about 4.8 per cent and nearly 11 per cent respectively in the calendar year 2010. At the other end of the spectrum, Spain showed the lowest proportions, with OC investment and OC stock at 1.2 per cent and 2.6 per cent of value added in the same year, respectively.

Figure 2.5: Aggregate business sector OC investment as a proportion of GVA in 2010



Notes: *Including ex-GDR from 1991; GVA is in local currency; Australian estimate is for the 12-industry market sector recalibrated to 2005 as the reference year for chain volume estimates and refers to the financial year 2009–10; international estimates refer to each country's harmonised business sector, definitions of market sector and business sector may not match. See Appendix A for details.

Sources: ABS (2015) Cat. No. 8165.0 op cit.; ABS (2015) Cat. No. 5260.0.55.002 op cit.; ABS (2015) Cat. No. 6291.0.55.003 op cit.; ABS (2015) Cat. No. 6306.0 op cit.; ABS (2014) Cat. No. 6310.0 op cit.; ABS (2014) Cat. No. 5204.0 op cit.; ABS (2013) Cat. No. 5215.0.55.001 op cit.; and Corrado C, Haskel J, Jona-Lasinio C & Iommi M (2014) Internationally comparable macro-estimates of investment in intangible assets at the industry level: INTAN – Invest, <http://www.intan-invest.net/>

It is important to acknowledge that the magnitude of OC cannot inform us about the quality or differentiation that is created as a result of this investment. Additionally, we cannot extrapolate from these results whether the current level of OC is appropriate given current economic structure. These figures can,

²⁴ Corrado C, Haskel J, Jona-Lasinio C & Iommi M (2014) Internationally comparable macro-estimates of investment in intangible assets at the industry level: INTAN – Invest, <http://www.intan-invest.net/>

however, provide us with an indication of how much value businesses are placing on accumulating OC.

3. Discussion

A consistent theme in the literature is the positive and significant relationship between business investment in intangibles and various measures of economic growth across different countries, and over different periods. Furthermore, demographic and fiscal constraints imply that future economic growth in Australia and elsewhere in the world will increasingly depend on knowledge-based increases in productivity and the associated spillovers.²⁵

Our experimental estimate suggests that OC investment in the Australian market sector as a whole is sizeable and growing at above the rate of investment in physical capital (machinery and equipment). It is reasonable to assume that these investments are made quite consistently over time, given the persistence of technological change and the ever-changing economic landscape. Even so, it is clear that there have been some major shifts in the underlying investment mix and capital structure in the market sector over the period we examined.

3.1 Trends and patterns in OC

Our results show that the relative importance of OC investment compared to physical capital investment has changed dramatically over time. We see that levels of OC investment increased during the 1990s, experienced decline from 2002 and subsequently appear to be stabilising around levels comparable to the early 1990s. It may suggest that the role of OC was underpinned by technological disruption in a complementary fashion. This would be consistent with theories of ICT productivity, which suggest that the productivity potential of ICT is only released when it is matched by organisational and managerial structural changes.²⁶

We also note that Hughes and Grinevich²⁷ attribute the business transformations behind Australia's productivity growth during the 1990s in part to the introduction of enabling technologies and improved management competencies. The observed investment pattern may therefore be related to the rapid uptake of ICT during the 1990s and the dotcom crash of 2000. While we have not investigated this connection, we would expect that the flattening and retreat observed in OC investment, relative to investment in physical capital, from 2000 onwards also occurred in ICT investment. Indeed there is evidence that in Australia, as well as in all G7 economies except for France, the share of GDP invested in ICT in 2013 decreased compared to 2003.²⁸

²⁵ OECD (Organisation for Economic Cooperation and Development) (2013) *New sources of growth: Knowledge-based capital*. OECD

²⁶ Biagi F & Parisi ML (2012) Are ICT, human capital and organization capital complementary in production? Evidence from Italian panel data, European Commission, Luxembourg

²⁷ Hughes and Grinevich 2007 cited in Department of Industry, Innovation, Science, Research and Tertiary Education (DIISRTE) (2012) op cit.

²⁸ OECD (2015) *Science, technology and Industry Scoreboard*. OECD, p. 96

A very cursory cross-country glance seems to suggest that businesses in the Australian market sector as a whole invest in OC about the same proportion of value added as Finland or Ireland, although this is less than some of their other international overseas counterparts (e.g. United Kingdom, United States, France). A proper cross-country comparison is beyond the scope of this paper as it would involve fully harmonising our methodology with the comparator countries, which is something that may be worth investigating for possible future research. At this stage, however, extra caution is required when interpreting this particular estimate as it may change in the future.

3.2 Potential shortcomings in the estimates

The popular Corrado et al.²⁹ methodology allows the value of intangible assets to be observed through time and across countries. This is likely to be an increasingly necessary measure as we transition to a knowledge based economy where tangible assets are not as necessary for increasing firm value. However, the unobserved nature of intangible assets makes them difficult to objectively measure with the same degree of certainty as physical capital. As a result, any estimate of intangible assets will have a number of caveats with regard to data availability, choosing appropriate depreciation rates and some necessary assumptions.³⁰

In this context, the OECD offers several practical recommendations to governments with a view to improving intangible measures, including:

- support better corporate disclosure by establishing voluntary recommendations and guidelines or backing existing private sector reporting initiatives
- create mechanisms to facilitate firms' reporting of investments in intangibles
- introduce frameworks for auditors
- engage in global coordination to improve international comparability of data and information supplied by firms.³¹

The need for better data for OC is highlighted by the Le Mouel and Squicciarini³² (2014) study which questions the assumption that a business' OC sits solely with managers. Their use of the PIAAC background survey to examine OC-related tasks suggests that the level of OC investment is seriously underestimated (their study suggests that managers account for less than half of total investment in OC. We have so far been unable to replicate this study in Australia and so our estimates are based on the assumption that OC should be measured through managers only.

²⁹ Corrado C , Hulten C & Sichel D (2005) *op cit.*; Corrado C , Hulten C & Sichel D (2006) *op cit.*

³⁰ See Barnes and McClure (2009) *op cit.* for discussion on measurement limitations and other methodologies

³¹ OECD (2013) *New sources of growth: Knowledge-based capital*. OECD Publishing

³² Le Mouel M and Squicciarini M (2015) *op cit.*

There are also questions surrounding the depreciation rates for OC. A study by Squicciarini and Le Mouel³³ reported that the depreciation rate for OC, particularly own account OC, has a linear depreciation rate varying between 10 and 25 per cent. In producing our estimates, however, we have used the 40 per cent depreciation rate for both OC categories as originally recommended in Corrado et al.³⁴ to allow for comparability across studies and countries.

3.3 Improvements upon earlier work

In producing these estimates, we have refined some elements of the *own account* organisational capital series. Most significantly we have utilised new releases of ABS employer survey data. This data is considered to be more accurate than the household survey data,³⁵ which has been used in the previous Australian estimates. Additionally the data provides a higher level of disaggregation and has allowed us to more accurately remove management employee classes that may overlap with other intangible capital categories, namely R&D and computerised information. Our estimates suggest that OC may have been underestimated in earlier Australian studies by about 25 per cent.

Recent attempts to quantify intangible capital at the firm level have highlighted its impact on outcomes.³⁶ However, as Hunter et al.³⁷ argue, the current practice in measuring intangibles at the enterprise level is not readily interpretable because it mixes the accounting cost measures with managerial value concepts. The authors suggest that the way towards a standardised approach to measuring the new intangibles is to adopt a back-to-basic costs approach that classifies investment in intangibles as assets, based on management intent at the time the investments are made. The authors further propose that a mandatory framework is necessary to motivate firms to participate.

The development of standardised measurement and reporting procedures at the firm level would allow for a more accurate and disaggregated breakdown of OC, which would in turn lead to new policy insights about the underlying nature of this type investment. In Australia and elsewhere, information about business investment in OC and other intangibles could ideally be extracted from administrative micro datasets linked to firm performance, confidentialised and reported on by national statistical agencies. In the absence of such detailed and comprehensive datasets, business surveys may also prove to be a useful

³³ Squicciarini M and Le Mouel M (2012) Defining and Measuring Investment in Organisational Capital: Using US Microdata to Develop a Task-based Approach, *OECD Science, Technology and Industry Working Papers*, 2012/05, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5k92n2t3045b-en>

³⁴ Corrado et al. (2006) op cit., p 26

³⁵ ABS (2014) *Understanding earnings in Australia using ABS Statistics*, Cat No. 6105, ABS, Canberra

³⁶ Dutz M, O'Connell S & Troncoso J (2014) *Public and Private Investments in Innovation Capabilities: Structural Transformation in the Chilean Wine Industry*, World Bank Policy Research Working Paper

³⁷ Hunter L, Webster E & Wyatt A (2005) op cit

alternative. The Department of Industry, Innovation and Science and the ABS have incorporated new questions related to OC into the next Business Characteristics Survey (2013–14 reference year) and are currently collaborating on the development of a national management capabilities survey. This work is expected to improve estimates of OC in the future.

Appendix A Methodology

A.1 Conceptual framework

The economic principle that underpins the concept of intangible capital is that any outlay that is intended to increase future rather than current consumption should be treated as capital investment.³⁸ In keeping with this principle, Corrado et al. argue that ‘there is no basis from the consumers’ point of view for treating investments in intangible capital differently from investments in plant and equipment, or tangible capital’.³⁹ Intangible capital therefore broadly refers to those assets that provide some future benefits but do not have an immediate physical embodiment.⁴⁰

There are two common approaches to measuring intangible capital: value-based and expenditure-based. The value-based approach tries to quantify intangibles by comparing financial market valuation to the book value of a firm’s tangible assets, while the expenditure-based approach seeks to directly estimate the business expenditures that qualify as investment. The latter approach seems to be preferred in the literature as it focuses on the relationship between intangibles and productivity growth, and it is also the approach we adopt in this paper (see Box 1).

Corrado et al.⁴¹ articulate the conceptual basis for capitalising intangible investments that have traditionally been treated as expenditures and set out the basic framework for measurement. This framework is widely referred to as CHS. Our paper follows the work of two previous Australian studies Barnes and McClure⁴² and De Rassenfosse⁴³, both of which apply the CHS framework using Australian data, the latter being contracted by the Department of Industry and Science.

Within the CHS framework, OC is divided into two components: *own account* investment (or stock) and *purchased* investment (or stock). For an individual firm, *own account* investment refers to the cost of managerial time allocated to improving the functioning of that organisation over a given period, while *purchased* investment is the cost of any consulting services relevant to improving the functioning of the organisation. Past investments accumulate to form the firm’s OC stock and this stock is assumed to depreciate quickly. Investments and stocks can be added up across businesses and industries to get an estimate of the overall levels of OC in the economy.

³⁸ Corrado et al. (2006) op cit.

³⁹ Corrado et al. (2005) op cit.

⁴⁰ Barnes & McClure (2009) op cit.

⁴¹ Corrado et al. (2006) op cit.; Corrado et al. (2005) op cit.

⁴² Barnes & McClure (2009) op cit.

⁴³ de Rassenfosse (2012) op cit.

The proportions in which the various forms of capital (both intangible and physical) are combined by businesses imply some sort of a *capital structure*, which results from the specific *investment mix*. While the investment mix and capital structure are likely to vary from business to business and across industry sectors, it can be useful to compare the overall levels of OC investment and stock in the economy to physical capital investment and stock over time. To compare OC and other intangibles across countries, some measure of value added is typically used.

We closely follow the approach of de Rassenfosse⁴⁴ and Barnes & McClure,⁴⁵ who apply Corrado et al.⁴⁶ in the Australian context. One advantage of the methodology is that it allows for international comparisons. In generating our estimates of OC we took the following steps:

1. Estimate investment in OC
 - 1.1 Collect relevant data sources for expenditure on each intangible
 - 1.2 Compile a time series of nominal expenditure
 - 1.3 Determine the share of expenditure that is to be treated as investment
 - 1.4 Select appropriate deflator and deflate to get a real investment series.
2. Build a real capital stock for intangible assets
 - 2.1 Determine the appropriate rate of depreciation for each intangible asset
 - 2.2 Use the perpetual inventory method to construct a real capital stock from the real investment series and assumed depreciation rates.

We adopt the 12-industry market sector definition using ANZSIC division codes. Published ABS for the 12-industry definition goes further back in time than data for the 16-industry definition.

We note that the market sector in each country is defined differently. Australian studies have invariably excluded Property & business services; Government administration & defence; Education; Health & community services; and Personal & other services 'because of the difficulties measuring outputs in some service industries'.⁴⁷

A.2 Data Sources

Purchased OC

We extended the nominal series generated by de Rassenfosse to update the figures for purchased OC. This involved using the data from the ANZSIC class 6962 Management Advice and Related Consulting Services in the Counts of

⁴⁴ de Rassenfosse (2012) op cit.

⁴⁵ Barnes & McClure (2009) op cit.

⁴⁶ Corrado et al. (2006) op cit.; Corrado et al. (2005) op cit.

⁴⁷ Barnes & McClure (2009) op cit.

Australian Business dataset.⁴⁸ This data source provides various turnover ranges (including \$0 to less than \$50k; \$50k to less than \$200k; \$200k to less than \$2m; and \$2m or more). We took the median of each data point and multiplied it by the number of firms to provide an indicator of turnover for all businesses in the sector. As no median exists for the \$2m or more turnover range, the figure for the open turnover range was established by comparing various amounts (\$3m, \$5, \$10m) with the Australian production amounts for IOPC 69000150 and IOPC69000160 in the input-output tables.⁴⁹ In both 2008–09 and 2009–10 (as with de Rassenfosse’s calculations for 2007–08 and 2006–07), \$3m was chosen as it mostly closely correlated to the figures from the input-output calculations. These figures were then scaled to the market sector.

Listed among the primary activities for the ANZSIC class 6962 Management Advice and Business Services is ‘Artist, entertainer or other public figures management service’. This is not an activity associated with our *purchased OC* component. As such, it was necessary to make a deduction to take into account this activity. An ABS survey⁵⁰ estimated that the public relations consulting accounted for 23 per cent of the total Business Management Services class (Business Management Services is the ANZSIC 1993 class). This was used by both de Rassenfosse and Barnes and McClure.⁵¹ As there have been no further releases or any comparable study that we could find to allow us to deuce the public relations aspect of the class, we have also deducted 23 per cent.

It was assumed that 80 per cent of this figure is to be part of the investment series. The other 20 per cent is set aside as a way of discounting any consulting that would be part of short term or unrelated consulting services. This assumption is somewhat arbitrary and this is acknowledged in the Corrado et al. methodology.

Own account OC

The estimated investment for this part of OC was based on the average salaries of managers. Though perhaps problematic, this dataset was used as it is assumed that managers are the primary holders of OC, though arguments have been made that this can vary by country and over time.⁵²

We used the Labour Force Survey⁵³ to ascertain the number of managers disaggregated to the four digit ANZSCO level. As the dataset is quarterly we used an average based on four quarters. We then removed a number of occupations. Among the occupations removed was farm managers as it is

⁴⁸ ABS (2015) *Counts of Australian Businesses, including Entries and Exits*, Cat. No. 8165.0, ABS, Canberra

⁴⁹ ABS (2013) *Australian National Accounts: Input-Output Tables (Product Details)*, Cat No. 5215.0.55.001, ABS, Canberra

⁵⁰ ABS (1995) *Selected Business Services*, Cat. No. 8677.0, ABS, Canberra

⁵¹ Barnes & McClure (2009) op cit.; de Rassenfosse (2012) op cit.

⁵² Le Mouel M and Squicciarini M (2015) op cit.

⁵³ ABS (2015) *Labour Force, Australia, Detailed, Quarterly*, Cat. No. 6291.0.55.003, ABS, Canberra

assumed that they are considerably different to other managers and do not build organisational capital in the same way that other managers are expected to.⁵⁴ Additionally, we were able to remove IT managers from these calculations. This exclusion is in line with Barnes and McClure and other international estimates to avoid double counting with another intangible capital category, computerised information. To avoid double counting with another intangible capital category, this time R&D, we also removed R&D Managers from our calculations. This does not yet appear to be common practice in international estimates but we deemed it necessary as labour costs form part of the R&D expenditure. We also removed commissioned and non-commissioned defence, fire and police managers as they clearly belong outside the market sector. It is possible in this method to be even more discerning when selecting the occupations within the manager class that may not be part of our market sector.

Since 2012, the ABS has begun releasing detailed wage data that has allowed us to have more control over calculating the wage cost of managers.⁵⁵ Previous to this, the data we could obtain was only disaggregated to the two digit level and though this allowed us to take into account some disparity in the wage data, further disaggregation reveals that there are large wage differences within each category. For example, as reported in May 2014, though each are classed under the two digit ANZSCO class, Specialist Managers, a female child care manager has average weekly cash earnings of \$534, while a male finance manager has average weekly cash earnings of \$3,120.

The other reason we favoured this data is that the ABS considers employer surveys, like the Employee Earnings and Hours survey⁵⁶, as more accurate. This is because the data is obtained from employer's payrolls whereas household surveys like the Employee Earnings, Benefits and Trade Union Membership⁵⁷ are limited by the reliance on the respondents recall of pre-tax earnings and because some respondents report on behalf of other members of the household.⁵⁸ However, there are limitations in using this dataset. Firstly, it is only released every two years (meaning we have averaged the results from 2011–12 and 2013–14 to get the wage data for 2012–13). Secondly, there have only been two releases with this level of disaggregation at the manager level to date. Therefore, we have also relied on the Employee Earnings, Benefits and Trade Union Membership⁵⁹ for data on wages between 1991–92 and 2010–11. This may explain a larger than expected difference in investment figures between 2010–11 and 2011–12.

⁵⁴ Barnes & McClure (2009) op cit.; de Rassenfosse (2012) op cit.

⁵⁵ ABS (2015) *Employee Earnings and Hours, Australia*, Cat. No. 6306.0, ABS, Canberra

⁵⁶ Ibid.

⁵⁷ ABS (2014) *Employee Earnings, Benefits and Trade Union Membership, Australia*, Cat. No. 6310.0, ABS, Canberra

⁵⁸ ABS (2014) *Understanding earnings in Australia using ABS Statistics*, Cat No. 6105, ABS, Canberra

⁵⁹ ABS (2014) Cat. No. 6310.0, op cit.

One of the issues that appear in disaggregated data is that there are a number of occupations that do not fit into any of the occupation classes and are marked at the two or three digit ANZSCO level with a 'no further definition' note attached. When this occurred for the Manager two digit ANZSCO class, we were able to use the average provided by the ABS in Table 10 of the Dataset which broke the wages by occupation and sex. When this occurred for the three digit ANZSCO level, we used an average of all of the four digit occupation that fit within the three digit occupation class.

Once we had multiplied wage data by the counts data and obtained a yearly investment figure, we multiplied this figure by the market share. We obtained the market share using unpublished ABS data, based on the Labour Force survey, which categorises four digit ANZSCO class by one digit ANZSIC level. The market share is calculated by adding up all employees from the 12 industries defined as being part of the market share and dividing that by the total number of employees. Initially we had sought to build our market share by only looking at the management classes of employees. This would have allowed us to remove the assumption that the share of managers to other employees remains stable over time. However, we found that the results from these calculation produced a significantly higher market sector ratio that that produced by de Rassenfosse.⁶⁰ For this reason and to be able to compare our results internationally, we have decided to also build our market sector share by looking at all employees.

Only 20 per cent of the annual total wages for managers is considered to form part of the investment series. This is an assumption based on a notion that 20 per cent of managers time is taken up in organisational innovation. Although arbitrary, this assumption, made by Corrado et al.⁶¹ has been adopted by previous Australian and international studies.

Deflation

The nominal (current price) investment series has been deflated by dividing it by the 12-industry GVA implicit price deflator. The deflator value for each period is simply the ratio of the index of nominal (current) value of GVA for the 12 market sector industries and the index of the real (chain) value for the same 12 market sector industries, in the corresponding period.

We obtained the numerator index vector by summing for each period the relevant current values from ABS Cat. No. 5204.0,⁶² and dividing these sums by the summed value of the same industries in the reference period. The value of the resulting index is equal to 1 in the reference period (2012–13). We obtained the denominator index vector directly from the ABS Cat. No. 5260.0.55.002.⁶³

⁶⁰ de Rassenfosse (2012) op cit.

⁶¹ Corrado *et al.* (2005) op cit.

⁶² ABS (2014) *Australian System of National Accounts*, Table 5 GVA by Industry, Cat. No. 5204.0, ABS, Canberra

⁶³ ABS (2015) *Estimates of Industry Multifactor Productivity*, Table 8 Estimates of Industry Multifactor Productivity, Cat. No. 5260.0.55.002, ABS, Canberra

The resulting vector from the ratio of these two indexes is the 12-industry GVA implicit price deflator by which we divided our estimated nominal investment series to obtain our estimate of the aggregate real investment series. The resulting aggregate real investment series estimate was calculated for the period covering financial years 1990 to 2013.

Capital stock derivation

The estimate of the notional capital stock of OC was derived using the perpetual inventory method (PIM) as described in Barnes and McClure.⁶⁴ The real capital stock in the first period $R[t=0]$ is calculated by dividing real investment in the first period $N[t=0]$ by the sum of the estimated (discrete) compound annual growth rate of real investment (g) over the period for which data is available and the depreciation rate (d , assumed to be 40 per cent):

$$R[t=0] = N[t=0] / (g + d)$$

The estimated (discrete) compound annual growth rate of real investment g is calculated by subtracting one from the exponent of the natural log of the quotient of last available value of real capital investment $N[t=n]$ and the first available value of real capital investment $N[t=0]$, divided by the number of periods n for which the real capital investment series is available:

$$g = \exp(\log(N[t=n]/N[t=0])/n) - 1$$

The real capital stock $R[t]$ in each subsequent period is calculated by scaling down the real capital stock estimate from the previous period $R[t-1]$ by the depreciation rate (assumed to be 40 per cent, in accordance with Corrado et al.⁶⁵) and then adding to it the real investment from the previous period $N[t-1]$:

$$R[t] = N[t-1] + R[t-1]*(1-d)$$

⁶⁴ Barnes & McClure (2009) op cit.

⁶⁵ Corrado C, Haskel J, Jona-Lasinio C & Iommi M (2012) *Intangible Capital and Growth in Advanced Economies: Measurement Methods and Comparative Results*, <http://www.intan-invest.net/>

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