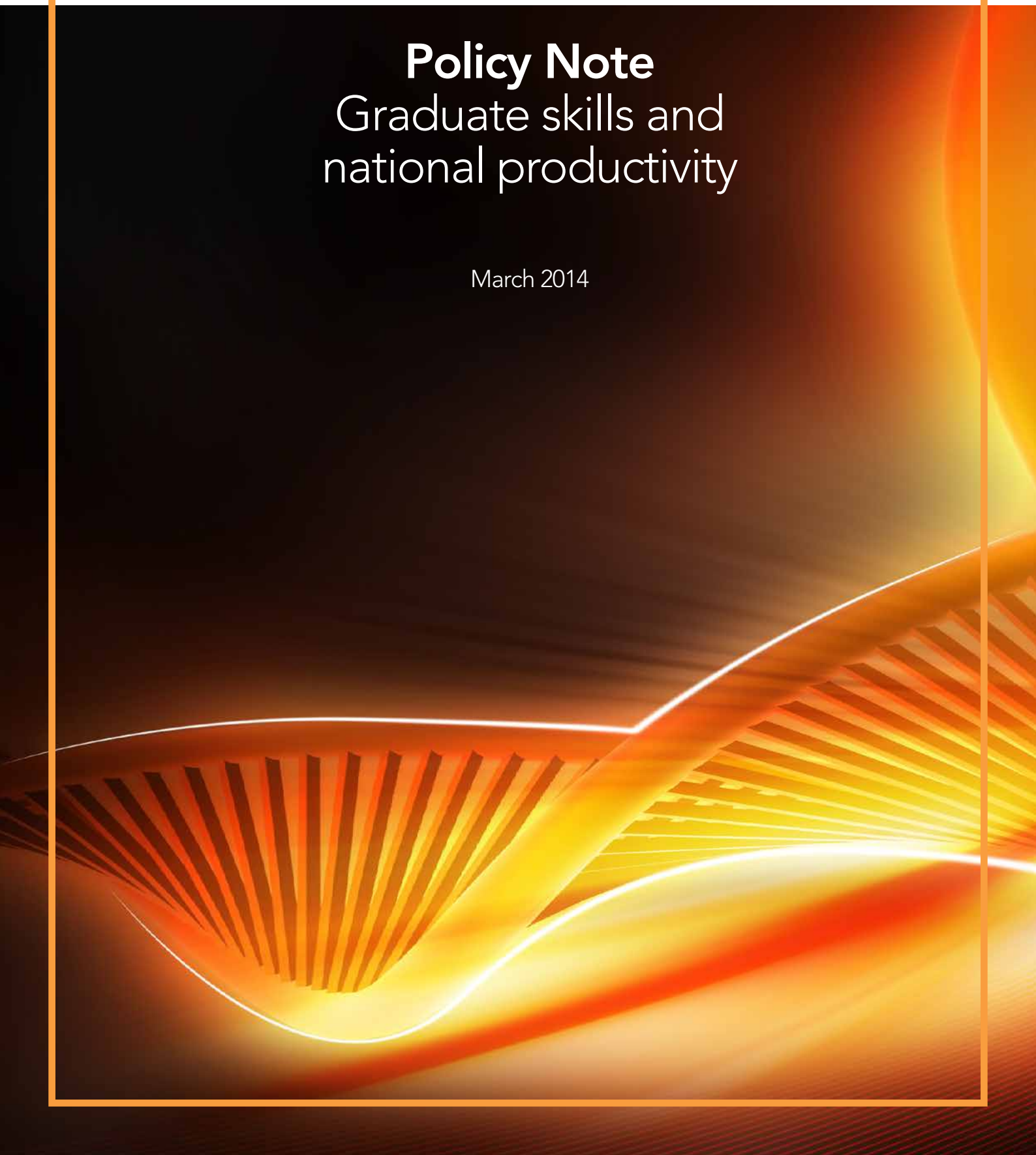
GROUP OF EIGHT AUSTRALIA

Policy Note

Graduate skills and national productivity

March 2014



Policy Note
Graduate skills and national productivity

Key Messages

- Universities play a critical role in driving productivity growth through training and education.
- University education and training adds value to the economy when the skills developed are absorbed into the nation's economic fabric. This is achieved through the development of human capital, the diffusion of knowledge and by contributing to an innovative culture.

There is a famous Paul Krugman quote that seems to be cited in almost every discussion piece on productivity. The reason this quote is so often repeated is because it so neatly articulates the end game for economic growth. The quote is:

> *Productivity isn't everything, but in the long run, it's almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker.*[1]

Absent a sustained increase in Australia's birth rate or a rapid increase in net migration, there are few mechanisms available to policy makers to maintain income growth outside of those that target productivity growth.[2] Moreover, the importance of productivity growth to the economy will only become more apparent in the wake of demographic changes and a declining terms of trade.

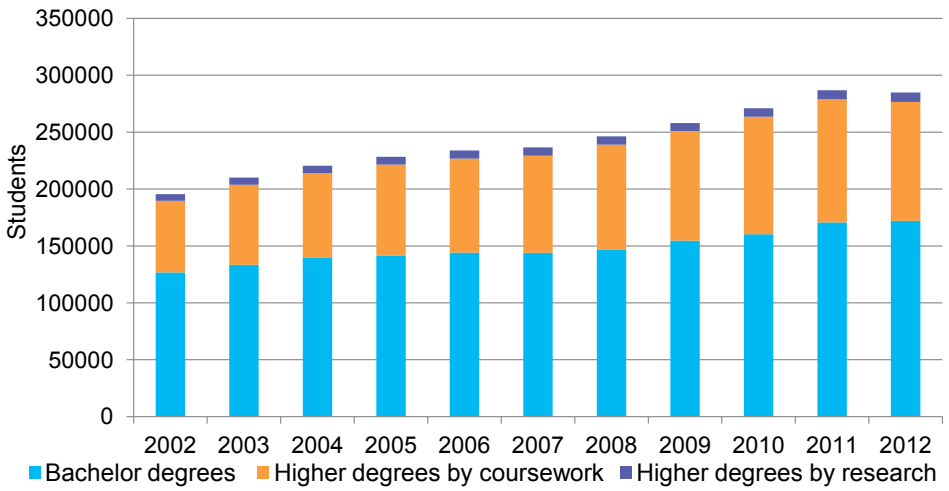
Universities play a critical role in this space and contribute to productivity growth through training and education. Higher education provides the workforce with a stream of skilled graduates that are competent in critical thinking and problem solving, as well as specialist technical skills.

Skills supply

Over the past decade, Australia's universities have graduated nearly 2.5 million students. Around 1.5 million graduations have occurred at the Bachelor level, with the remainder completing postgraduate studies by either coursework (890[3] thousand students) or research (72 thousand). The majority (65 per cent in 2012) of graduations are domestic students. Students completions over the past decade are reported in Figure 1 below.

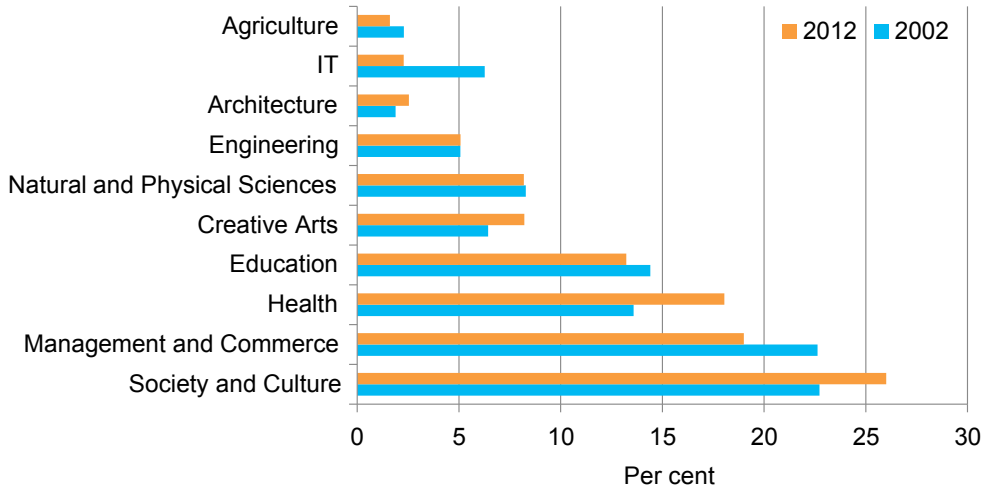
1 Paul Krugman (1994), The Age of Diminishing Expectations, MIT Press.
2 Australian Treasury (2009), Raising the level of productivity growth in the Australian economy, Submission to the House of Representatives Standing Committee on Economics Inquiry into raising the level of productivity growth in the Australian economy, August.
3 Department of Education (2013), Award Course Completions, available at: http://education.gov.au/selected-higher-education-statistics-2012-student-data

Figure 1: Student completions by level of study, 2002-2012[4]



The profile of student graduations in 2012 looks quite similar to that of a decade ago, with the majority of students completing degrees in society and culture, management and commerce, health and education fields. Combined, these fields account for three quarters of total course completions. Over the decade, there has been a noticeable drop off in the proportion of students graduating in IT and commerce courses and an increase in health (see Figure 2).

Figure 2: Completions by domestic students, by field of study, 2002 and 2012[5]



Skills absorption

University education and training adds value to the economy when the skills developed are absorbed into the nation's economic fabric. When this is achieved, an economy is more productive, innovative and prosperous. There are also significant civic advantages to a higher educated economy.

At a high level, education adds value to the society through four broad means, these are discussed below.

4 Ibid
5 Ibid

Increasing the stock of human capital

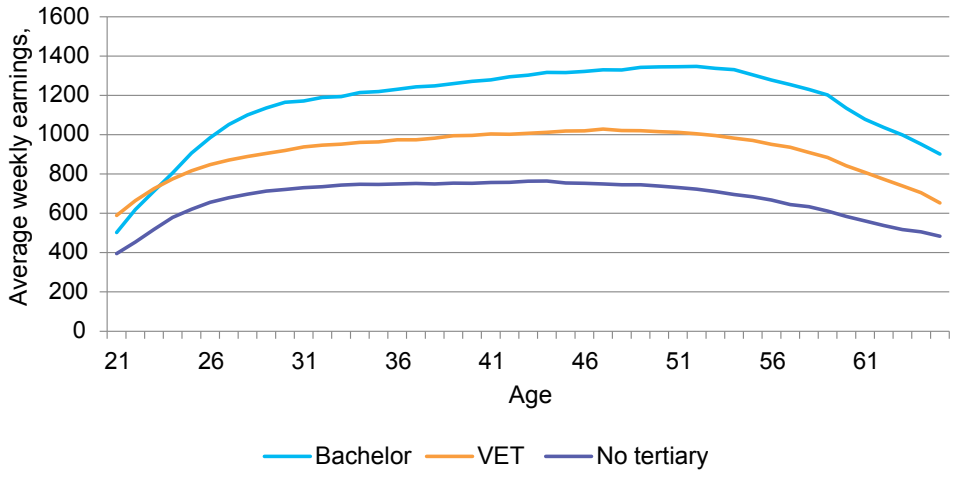
Perhaps the most obvious way graduates contribute to productivity growth is through their contribution to the nation's stock of human capital. Human capital refers to "the knowledge, skills, competencies and attributes embodied in individuals that facilitate the creation of personal, social and economic well-being."[6]

The impact of higher education on productivity can be seen in its effect on wages and earnings. Wages provide a relatively close measure of the value of a worker's "marginal product". In a competitive market, the wage paid to the final worker employed should be no more than the value of their output.[7]

The figure below plots the age-earnings profile for full time workers with no tertiary education, vocational training and a bachelor's degree as reported in the 2011 Census. At almost every point along the profile, graduate wages exceed school leaver wages by 75 per cent or more.

This relationship has been studied at length by academics and policy makers alike.[8] The literature suggests that, on average, an additional year of learning increases an individual's wage by between 5 and 16 per cent. A recent study by the PC[9] however, found that university education increased wages by as much as 38 per cent.[10]

Figure 3: Age-earning profiles, by level of education



The benefits of a more productive economy are considerable. From a government's perspective, higher-income households are less likely to draw on government services and the progressive tax system ensures that they provide greater revenues. This increase in the government's capacity to provide public services is highly important under an ageing population.

Knowledge diffusion

Second, the education and training provided by universities is highly important for disseminating new ideas and research throughout industry. By moving from universities to business, graduates "bring to industry an 'attitude of the mind' and a 'tacit ability' to acquire and use knowledge in new and powerful ways."[11] They carry with them the knowledge, skills, expertise and awareness of modern technologies and thinking they developed through their university education. Graduates are aware of the most recent developments in their disciplines, and of the relevance of these advances, because university research activities inform their teaching. In addition, university education builds the broader skills and competencies such as critical thinking, effective communication and cultural awareness that underlie much modern business.

6 OECD 2001, The Well-being of Nations: The Role of Human and Social Capital, Paris.
7 Productivity Commission (2010), The Effects of Education and Health on Wages and Productivity, Productivity Commission Staff Working Paper, March.
8 See AWPA (2013), Human capital and productivity, March.
9 Productivity Commission (2007), Effects of Health and Education on Labour Force Participation, Productivity Commission Staff Working Paper.
10 38 per cent for men and 37 per cent for women. In previous research, the PC has also found university education to have a significant effect on workforce participation. Their estimates suggest university education increased the probability of participation by between 15 and 20 per cent for men and between 8 and 10 per cent for women.
11 Salter, AJ and Martin, BR (2001), "The economic benefits of publicly funded basic research: a critical review," Research Policy, 30:509-532, 532.

Graduate recruitment provides access to the latest research and in itself can provide informal links to university staff. This is important because the empirical evidence suggests that the major factor limiting business innovation is the lack of creative people and people having the necessary skills and expertise, not access to information and research.

A number of international studies have also shown that growth in the international stock of knowledge has an impact on productivity growth not only of the countries in which the research is conducted but also of other countries. However, these studies also indicate that the extent to which a country benefits from international knowledge formation depends on factors such as the availability of a workforce appropriately skilled to understand and adapt this knowledge and the extent to which the country is linked into international knowledge networks.[12] In other words, an educated and skilled workforce is necessary for Australian firms to capitalise on advances made in international research.

Creating an innovative culture

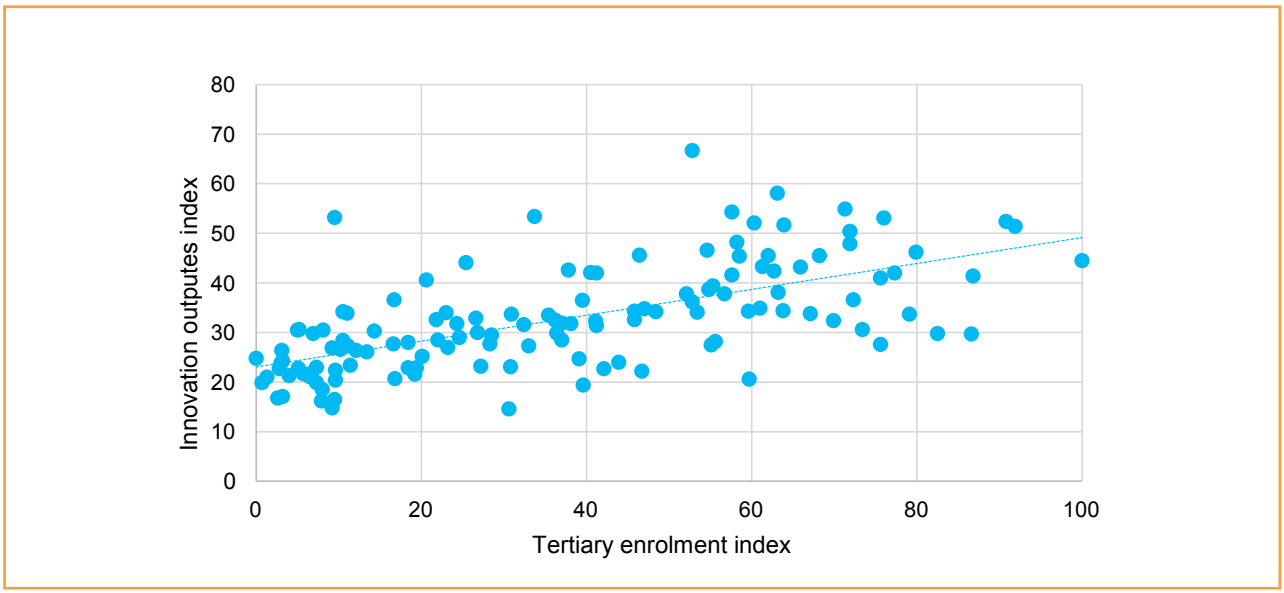
The third way in which graduates help promote productivity is in through their contribution to innovation.

The link between innovation, productivity and skills has been described as a "virtuous circle", with each element positively reinforcing the others. There is a growing body of literature that illustrates how higher levels of skills enable individuals and workplaces to adopt or develop new ideas and processes. This literature has demonstrated for example, that human capital contributes to productivity growth through enhanced innovation by:

- promoting the transfer of knowledge between firms, industries and countries;[13]
- developing absorptive capacity so that firms can better innovate or adopt best practices;[14] and
- promoting mobility of skilled workers that may assist, for example, in disseminating ideas and processes.[15]

As an example, the figure below plots the relationship between a country's tertiary enrolments and "innovation outputs" for some 133 countries using data from the Global Innovation Index. Innovation outputs include a range of knowledge and creative outputs such as patents, citations, royalties, web content and technology exports. While there are a number of drivers of innovation (as well as limits to how much those drivers can achieve), the figure illustrates a strong positive correlation between tertiary enrolment and innovation.[16]

Figure 4: Tertiary enrolment and innovation outputs[17]



12 Salter and Martin (2001), 532
13 Lundvall BA (1992), National Systems of Innovation: Towards a Theory of Innovation and Interactive Learning, Frances Pinter, London.
14 Griffith, R, Redding, S and Van Reenen, J (2004), "Mapping the Two Faces of R&D: Productivity Growth in a Panel of OECD Industries," The Review of Economics and Statistics, 86(4): 883-895.
15 Mason, G. Beltramo, JP and Paul, JJ (2004), "External knowledge sourcing in different growth settings: a comparison of electronics establishments in Britain and France," Research Policy 33(1):53-72.
16 Knowledge Partners (2014), The Global Innovation Index 2013, available at: http://www.globalinnovationindex.org/content.aspx?page=GII-Home
17 Ibid

Promoting social and civic benefits

In addition to the traditional avenues by which learning has been thought to contribute to productivity, there is also evidence of benefits through less obvious routes. Studies, for example, have found associations between learning and improved health, societal and environmental outcomes. In addition, it is also likely that investment in learning by one worker increases the productivity of his or her co-workers (these benefits would be external to the individual but internal to firms and the economy as a whole).

Conclusion

Australia has undergone a profound structural shift in recent decades — with a workforce transformed by changes in industry, demography and educational attainment. In the 1980s, almost a quarter of all employed Australians worked in manufacturing or agriculture. Today, just over one in 10 people work in these sectors. Employment in professional and technical services, healthcare and social assistance has increased significantly.[18]

While governments can influence productivity growth through policies that foster an environment conducive to improvement, productivity is largely driven by employers and workplaces. Technological innovations such as high speed internet, nanotechnology and biotechnology will continue to shape Australian workplaces, the pace at which they will able to do this will inevitably slow.

More than three quarters of our workplaces rely on people delivering services rather than goods, and the majority of innovation here is incremental. Furthermore, as Australia moves "closer to the frontiers of economic performance, our progress will depend more and more on our capacity as a society to invent, innovate and adapt."[19] This means that investing in skills will be an increasingly important factor to improving productivity in Australia.

18 Banks, G (2010), "Advancing Australia's human capital agenda," Ian Little lecture, Melbourne, April.
19 Ibid