

## Global skills crunch: A case of dog eat dog?

TOM KARMEL

NCVER

PRESENTED TO THE WELLINGTON EXCHANGE—  
EVOLVING HIGHER EDUCATION AGENDAS  
4 DECEMBER 2008

The views and opinions expressed in this document are those of the author/project team and do not necessarily reflect the views of the Australian Government or state and territory governments.

© National Centre for Vocational Education Research, 2009

This work has been produced by the National Centre for Vocational Education Research (NCVER) on behalf of the Australian Government and state and territory governments with funding provided through the Australian Department of Education, Employment and Workplace Relations. Apart from any use permitted under the *Copyright Act 1968*, no part of this publication may be reproduced by any process without written permission. Requests should be made to NCVER.

The views and opinions expressed in this document are those of the author and do not necessarily reflect the views of the Australian Government or state and territory governments.

TD/TNC: 95.07

Published by NCVER  
ABN 87 007 967 311

Level 11, 33 King William Street, Adelaide, SA 5000  
PO Box 8288 Station Arcade, Adelaide SA 5000, Australia

ph +61 8 8230 8400 fax +61 8 8212 3436  
email [ncver@ncver.edu.au](mailto:ncver@ncver.edu.au)  
<<http://www.ncver.edu.au>>  
<<http://www.ncver.edu.au/publications/2107.html>>

## About the research

---

### Global skills crunch: A case of dog eat dog?

*Tom Karmel, NCVER*

This paper was presented to a meeting of the Wellington Exchange, an international group of higher education officials, in December 2008.

One of the topics of the meeting was the issue of possible skills shortages emerging as a result of demographic trends, with the ageing of the population of developed countries. The session consisted of this paper as a discussion opener, followed up by commentary by Sue Richardson (Australia), Constantine Curris (United States), and Herb O'Heron (Canada).

The conference organisers had set the scene with a series of questions:

*The global skills crunch: A case of dog eat dog?*

- ❖ *Are we facing a demographic time bomb?*
- ❖ *How are countries addressing skills needs through higher education?*
- ❖ *Can we meet the needs of the labour market and emerging industries?*

This paper argues that these are not a set of issues about which we need to be alarmist. There is little evidence of impending skills shortages, although it certainly will be the case that the ageing of the population will impact on the structure of the economy. While the labour market of the future will favour the highly skilled, there has been a significant increase in the proportion of the workforce with a degree, and graduate salaries have been increasing at a very modest rate. We have observed increasing proportions of graduates in a whole range of occupations. In any case, over and above the market mechanisms that act against the emergence of skills shortages, there are various mechanisms that can ameliorate an inadequate number of graduates: increases in labour force participation rates of graduates, a reduction in the number of high Year 12 achievers who do not go to university, an increase in the number of overseas students, and skilled migration.

This is not to say that there will be no skills shortages in specific areas and that we should not be at all concerned about the issue. We need to monitor relative wages and starting salaries, and pay particular attention to those degrees which are considered to be particularly critical (for example, medical specialists). We also need to be aware that the business cycle can have a much more dramatic effect on the demand for skills than demographic trends.

Tom Karmel

Managing Director, NCVER

---



# Contents

---

Tables and figures	6
Global skills crunch: A case of dog eat dog?	7
Introduction	7
My starting point	10
Evidence of skills shortages	10
Ways of meeting skills shortages	14
Discussion	16
Final comments	17
References	18

# Tables and figures

---

## Tables

1	Proportion of employed persons with a bachelor degree or above qualification by occupation, Australia, 1996–2006	10
2	Weekly wages for full-time wage and salary earners, by level and field of qualification, Australia, 2005	12
3	Median starting salary for bachelor degree graduates aged less than 25 years old in first full-time employment by field of education, Australia, 2007	13
4	University status of Y95 cohort by achievement quartile and sex, Australia, 2006	15
5	Number of domestic and overseas higher education students by qualification level, Australia, 2007	15

## Figures

1	Proportion of population aged 20 to 64 years, Australia, 2008–2040	8
2	Population profile by age and sex, Australia, 2008 and 2040	8
3	Proportion of total employment held by managers and professionals, Australia, 1986–2008	9
4	Proportion of all persons with a post-school qualification, Australia, 1992–2008	9
5	Skilled vacancy index by occupation, Australia, January 1984 to November 2008	11
6	Labour force participation rate for bachelor degree or above qualification holders by sex and age, Australia, 2005	14
7	Number of permanent departures and settler arrivals by occupation, Australia, 2006–07 (financial year)	16
8	Projection of registered nurses, allowing for an increase in the number of new graduates, Australia, 2000–2020	17

# Global skills crunch: A case of dog eat dog?

---

## Introduction

### The global skills crunch: A case of dog eat dog?

- ✧ Are we facing a demographic time bomb?
- ✧ How are countries addressing skills needs through higher education?
- ✧ Can we meet the needs of the labour market and emerging industries?

These are a challenging set of questions posed for the Wellington Exchange meeting.

I begin my discussion of the topic with four stylised facts. While I use Australian data to illustrate my stylised facts, I would be very surprised if the trends are not similar in other Wellington Group countries<sup>1</sup>.

#### *Stylised fact 1*

There are significant demographic trends in many countries, and Australia is no exception. Figure 1 shows the working age population as a share of the total population up to 2040. This proportion declines significantly as the population ages. The ‘onion’ diagrams in figure 2 tell the same story.

These demographic changes will constrain labour force (and hence economic) growth and increase dependency rates. So they will affect the structure of the economy, but it is by no means obvious why they should lead to skills shortages as such.

#### *Stylised fact 2*

The most rapidly growing occupational sector is the professional sector, reflecting the way economies are moving into a services age. This is seen in figure 3, from which we see that the share of employment held by managers and professionals has increased from around 30% in the late 1980s to around 42% in 2008. The higher education sector is the main source of trained labour for these occupations.

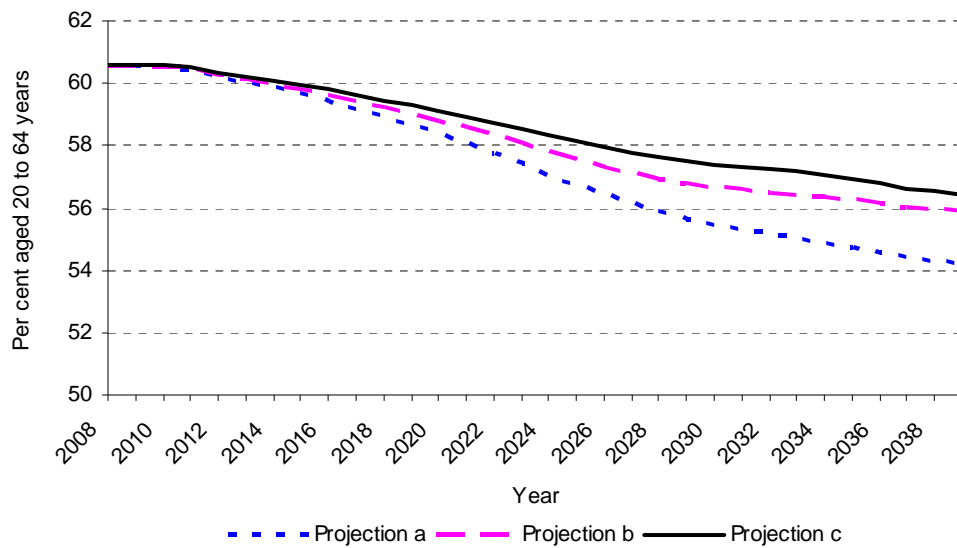
#### *Stylised fact 3*

There have been very significant increases in the number of graduates. Figure 4 shows that the proportion of the population with a post-school qualification has increased from around 42% in the early 1990s to around 54% in 2008. Degree holders have made a very substantial contribution to this trend, with the proportion increasing from under 10% in 1992 to around 22% in 2008.

---

<sup>1</sup> The Wellington Group is an informal, periodic seminar of higher education policy and institutional leaders from seven countries—Australia, Canada, England, Ireland, New Zealand, Scotland and the United States.

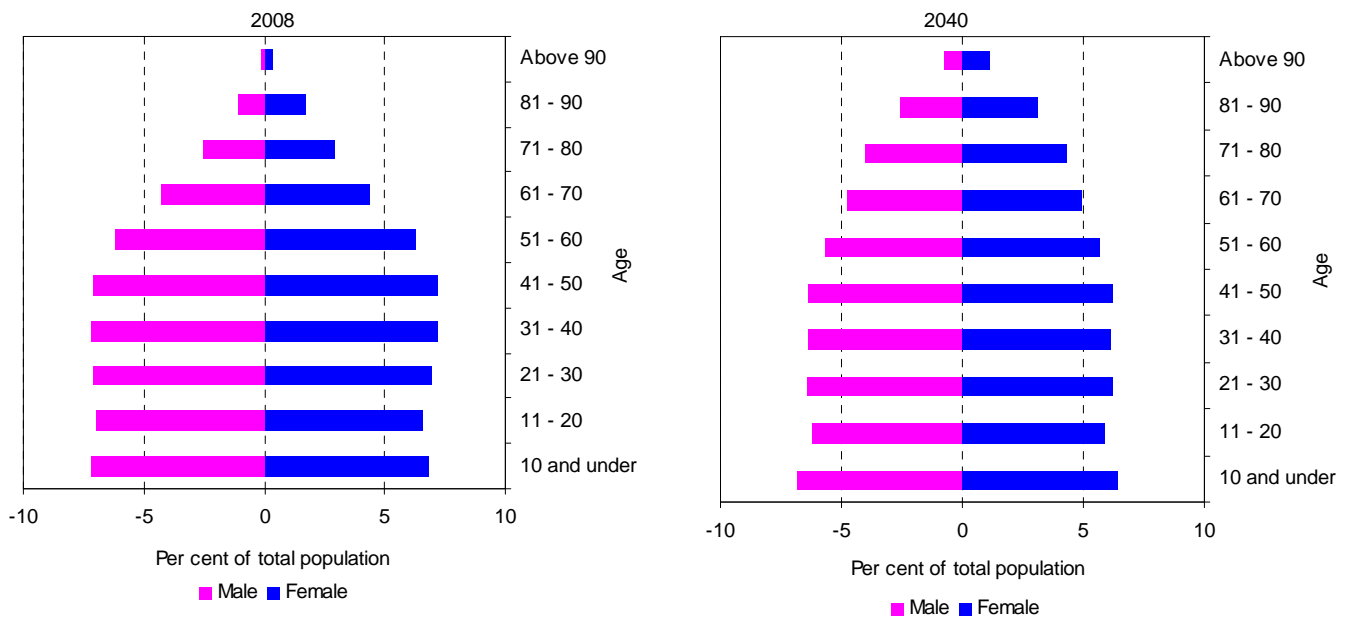
**Figure 1 Proportion of population aged 20 to 64 years, Australia, 2008–2040**



Notes: Projections a, b and c differ on assumptions about fertility rates, net overseas migration and life expectancy. Projection a has the most aggressive assumptions and projects the 2040 population to be 35.0 million. By contrast, projections b and c project the national population in 2040 to be 31.3 and 28.7 million, respectively.

Source: ABS, *Population projections 2006 to 2101*, cat. no.3222.0.

**Figure 2 Population profile by age and sex, Australia, 2008 and 2040**

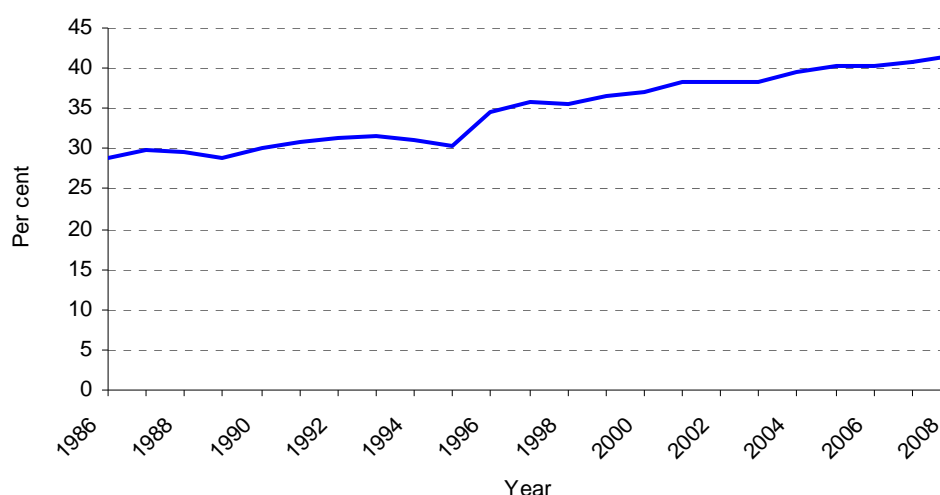


Note: Projection a used.

Source: ABS, *Population projections 2006 to 2101*, cat. no.3222.0.



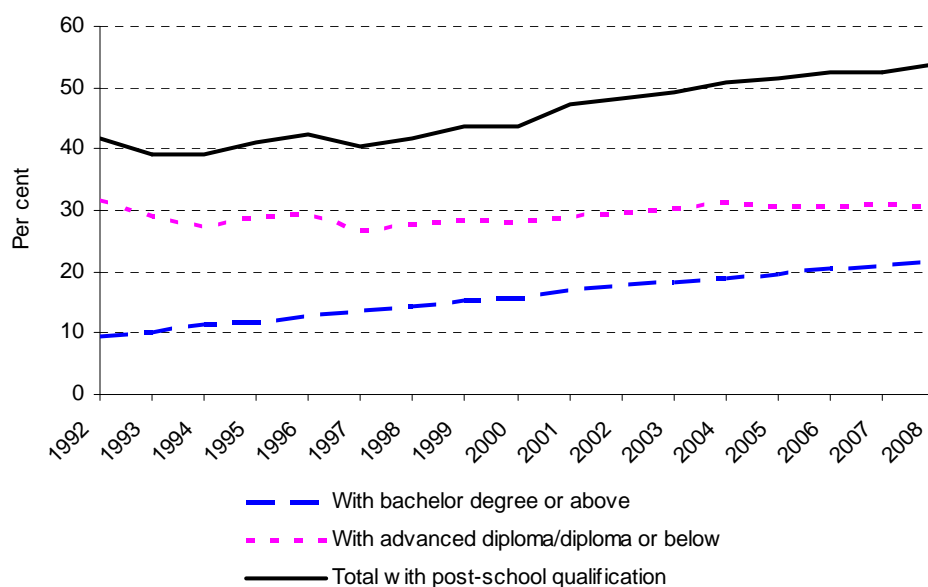
**Figure 3 Proportion of total employment held by managers and professionals, Australia, 1986–2008**



Note: Break in series in 1996 due to change from ASCO version 1 to ASCO version 2.

Source: ABS, *Labour Force, August 2008*, cat. no.6291.0.55.003.

**Figure 4 Proportion of all persons with a post-school qualification, Australia, 1992–2008**



Source: ABS, *Education and work, 2002–2008*, cat. no 6227.0.

#### *Stylised fact 4*

While the bias in the change in the structure of the labour market is toward those with qualifications, the output of the education and training sector has been sufficiently large to result in skill deepening, with the proportion of occupational groups with a qualification increasing over time. So table 1 shows that the proportion of employed persons in managerial occupations with a degree has increased from 22% in 1996 to 32% in 2006. Similarly, the proportion in professional occupations has increased from 56% to 67%. However, we also see increases in the proportion of employed persons with a degree in occupations which are not typically thought of as ‘higher education’ occupations.

**Table 1 Proportion of employed persons with a bachelor degree or above qualification by occupation, Australia, 1996–2006**

	1996	2001	2006
	%	%	%
Managers and administrators	21.9	26.9	32.2
Professionals	56.2	62.0	66.6
Associate professionals	11.6	15.5	18.9
Tradespersons and related workers	1.5	2.0	2.6
Advanced clerical and service workers	6.9	9.4	12.7
Intermediate clerical, sales and service workers	7.0	8.7	11.3
Intermediate production and transport workers	1.9	2.4	3.3
Elementary clerical, sales and service workers	4.2	5.0	7.0
Labourers and related workers	2.1	2.5	3.6
<b>Total employed</b>	<b>15.5</b>	<b>18.7</b>	<b>22.0</b>

Source: ABS Census, 1996, 2001 and 2006.

The issue here is whether this ‘skill deepening’ reflects the changing nature of labour demand or whether it reflects either an oversupply of graduates or issues with the quality of some graduates or credentialism (by which we mean credentials being used as a filtering mechanism by employers in situations in which the job does not require that level of education).

## My starting point

As a labour economist I have a fair bit of faith in the ability of markets to facilitate transition, and my immediate response is that we do not face a global skills crunch. There is no such thing as deterministic labour demand. If mining engineers are vital for new mines, then a lack of a ready supply of unemployed mining engineers will bid up the cost of opening a new mine. But the mining industry will continue, perhaps at a lower level of activity than would have been the case if there were more mining engineers.

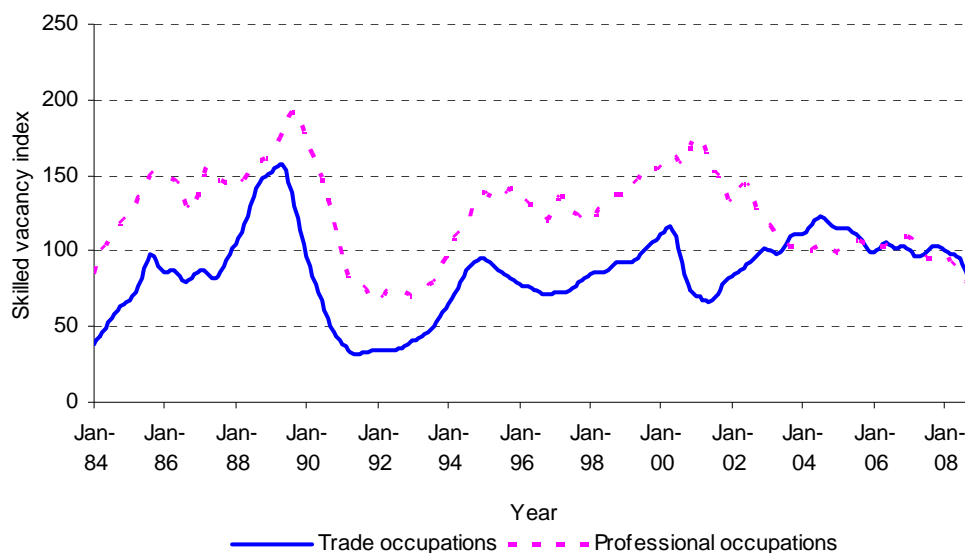
However, we have observed some intractable shortages—such as doctors in rural areas—and therefore we should take the proposition seriously. First, I look for evidence that there are skills shortages emerging among the more highly skilled occupations serviced by higher education. I then look at the various means of meeting skills shortages. I conclude with some discussion and comments.

## Evidence of skills shortages

It certainly could be argued that the fact that there have not been ‘disastrous’ skills shortages over the past decade or so does not imply that they will not emerge in the future as the demographics begin to bite. On the other hand, the existence of skills shortages now would make us more concerned about the future than otherwise would be the case. We should also remember that we have seen falls in the number of young people already in the troughs succeeding the peaks of the baby boom and its reflection in later generations. Therefore, I argue that the existence of skills shortages, or not as the case may be, is pertinent to the future. I look at four indicators: skilled vacancies, relative earnings, the starting wages of new graduates, and the proportion of qualified people in an occupation.

Figure 5 plots the skilled vacancy index from the recession of the early 1980s. We see that there is a good deal of cyclical behaviour for both professional and trades occupations. In recent times both the trades and professional indexes have been trending downward.

**Figure 5 Skilled vacancy index by occupation, Australia, January 1984 to November 2008**



Source: Department of Education, Employment and Workplace Relations, *Skilled vacancy report*, November 2008.

One of the problems with the skilled vacancy index is that it is primarily designed to pick up cyclical deviations from long-term trends. So it may have limitations to its use in analysing long-term phenomena. By contrast, our second indicator, relative wages, should pick up both short-term and long-term trends. The argument is quite straightforward. If there is a skills shortage pertaining, say, to those with higher education qualifications, then we would expect to see an increase in the relative wages of those people. It is relatively easy to get data by qualification level, but this is of limited use in exposing the existence of skills shortages. Ideally, we need data by field of study. I have compiled such data for 2005 which is presented in table 2.

We see that certainly there is a return to a degree (note that we have combined degrees with diplomas because of sample size limitations) but there is certainly considerable variation in relative wages by field of study. On average, those with information technology degrees are the best paid. None of the relativities are extreme, although I acknowledge that the field of study classification is fairly coarse and no doubt there would be greater differentiation at a finer level. We can be fairly confident, however, with two conclusions: overall there is no evidence for an inadequate supply of people with degrees; and there seems to be a surplus of people with architecture and building, agriculture, and creative arts degrees.

Table 2 considered the whole population. The salaries of new graduates provide a more immediate reflection of skills shortages since they are recruited by employers 'at the margin'. Table 3 provides median starting salaries for young graduates in 2007, and also growth rates over the last 30 years.

**Table 2 Weekly wages for full-time wage and salary earners, by level and field of qualification, Australia, 2005**

	Full-time wage and salary earners	
	Weekly \$	Relative to Year 12
<b>Year 11 or below</b>	687	0.90
<b>Year 12</b>	765	1.00
<b>Certificate I/II</b>		
Science, IT, engineering	715	0.93
Architecture, building, agriculture	667	0.87
Health, education, society and culture, creative arts	723	0.94
Management and commerce	734	0.96
Food, hospitality, personal services	770	1.01
<b>Certificate III/IV</b>		
Science, IT, engineering	798	1.04
Architecture and building	873	1.14
Agriculture	630	0.82
Health	745	0.97
Education, society and culture, creative arts	719	0.94
Management and commerce	800	1.04
Food, hospitality, personal services	760	0.99
<b>Diplomas and degrees</b>		
Science	1 071	1.40
Information technology	1 210	1.58
Engineering	978	1.28
Architecture and building	787	1.03
Agriculture	788	1.03
Health	1 086	1.42
Education	1 022	1.34
Management and commerce	1 040	1.36
Society and culture, food, hospitality and personal services	1 000	1.31
Creative arts	838	1.10

Note: Calculated for a male, age 30, working 40 hours (for the hourly rate). The relativity to Year 12 is not affected by this assumption.

Source: Karmel (forthcoming).

**Table 3 Median starting salary for bachelor degree graduates aged less than 25 years old in first full-time employment by field of education, Australia, 2007**

	Median salary	Index of growth of median salary	Index of growth of male average weekly earnings
	2007 (\$'000)	1977 to 2007	1977 to 2007
Dentistry	68.0	444.4	559.4
Optometry	56.5	-	559.4
Medicine	51.0	391.0	559.4
Earth sciences	50.0	515.5	559.4
Engineering	50.0	495.0	559.4
Mathematics	46.0	484.8	559.4
Education	46.0	460.0	559.4
Law	45.0	789.5	559.4
Social work	44.0	426.5	559.4
Computer science	43.2	431.4	559.4
Paramedical studies	43.0	-	559.4
Physical science	42.9	457.4	559.4
Psychology	42.0	446.8	559.4
Biological sciences	41.0	436.2	559.4
Accounting	40.0	459.8	559.4
Agricultural science	40.0	408.2	559.4
Architecture and building	40.0	459.8	559.4
Economics and business	40.0	430.1	559.4
Veterinary science	40.0	416.7	559.4
Social science	39.4	418.9	559.4
Humanities	38.0	408.6	559.4
Art and design	35.0	-	559.4
Pharmacy	34.0	485.0	559.4

Source: Graduate Careers Australia, *Graduate salaries, 2007*.

On the whole, the starting salaries are fairly modest. The most remunerative field is dentistry, followed by optometry. The huge starting salaries we read about in the newspaper for engineers and accountants, for example, clearly only apply to the tail of the distribution, not the median. When we look at growth over the last 30 years, the salaries of new graduates have generally not kept up with average weekly earnings, with the exception of law (and would anyone argue that we have a shortage of lawyers?). Thus, there is little evidence to support the idea that there is a long-term trend to a shortage of university graduates.

Finally, I refer back to table 1 in terms of looking at the proportion of graduates by occupation. The argument would be that in a shortage, employers would have to recruit people with less than ideal qualifications. Thus a decline in the proportion of people in an occupation with a degree might be evidence of skills shortages in those occupations, on the assumption that we believe a degree improves productivity in those occupations. But there is no evidence of this. In every occupational group the proportion with a degree has increased.

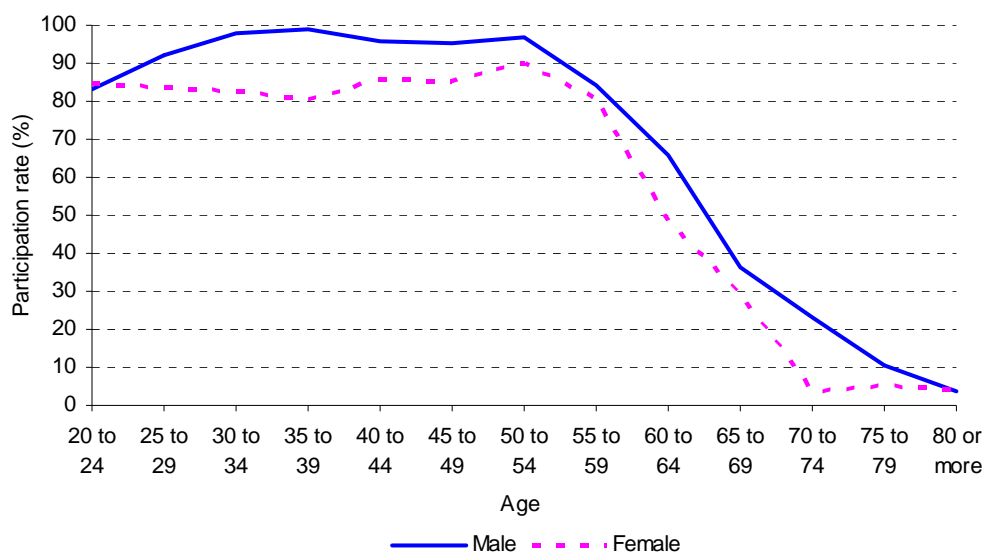
Thus, the evidence does not support the notion that there are long-term trends heading toward skills shortages through a lack of graduates. If anything, the opposite is true.

## Ways of meeting skills shortages

In any case, there are many ways in which potential skills shortages can be addressed, and these we now turn to.

An obvious way of increasing the supply of skilled persons is to encourage those with valuable qualifications to work. As can be seen from figure 6, there are considerable numbers of degree holders within the working age population who do not currently participate in the labour force.

**Figure 6 Labour force participation rate for bachelor degree or above qualification holders by sex and age, Australia, 2005**



Source: ABS 2005, Survey of education and training, CURF (confidentialised unit record file).

Increases in female participation are feasible for those in their mid-20s through to retirement age, although increased support for childcare would have to be forthcoming. In addition, the participation rates of people with degrees begin to taper off quite quickly after the age of 50 years. The fact that there are considerable numbers of degree holders working in their 70s also indicates that there is considerable potential to increase the labour supply of degree-educated people.

The second area I wish to look at is the potential supply of university students. While we have a mass higher education system, and we bemoan the fact that too many students of relatively low ability go to university, in fact there are considerable numbers of young people with high academic ability who do not go to university. In table 4 we present data from the Longitudinal Survey of Australian Youth (LSAY) (these young people are around 24 years old in 2006). We see that 28% of males in the highest achievement quartile (based on tests in Year 9) and 19% of females do not go to university. For the second quartile the figures are 52% and 37%, respectively. My point is that we are not going to run out of young people with the ability to go to university. The demographics give me little concern here.

**Table 4 University status of Y95 cohort by achievement quartile and sex, Australia, 2006**

	Highest quartile of achievement		Second highest quartile of achievement	
	Male	Female	Male	Female
	%	%	%	%
Currently undertaking university study	7.1	5.7	6.3	7.1
Completed university study	41.9	52.7	28.0	40.6
Commenced university study but did not complete	14.0	10.6	9.7	10.0
Never commenced university	28.3	19.3	52.4	37.3
Completed university study and undertaking further study at bachelor or higher level	8.6	11.6	3.6	5.1
<b>Total</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

Notes: Achievement quartiles based on mathematics and English scores when respondents were in Year 9 in 1995.

Source: Longitudinal Surveys of Australian Youth (LSAY), Y95 cohort, unpublished data.

Another way of increasing the number of graduates that Australia produces is to increase the number of overseas students (accompanied by appropriate immigration regimes). Table 5 shows that overseas students make up 50% of postgraduate coursework students and around 20% of undergraduate and postgraduate research students. Again, overseas students are an important source of skilled labour supply if we choose to tap it.

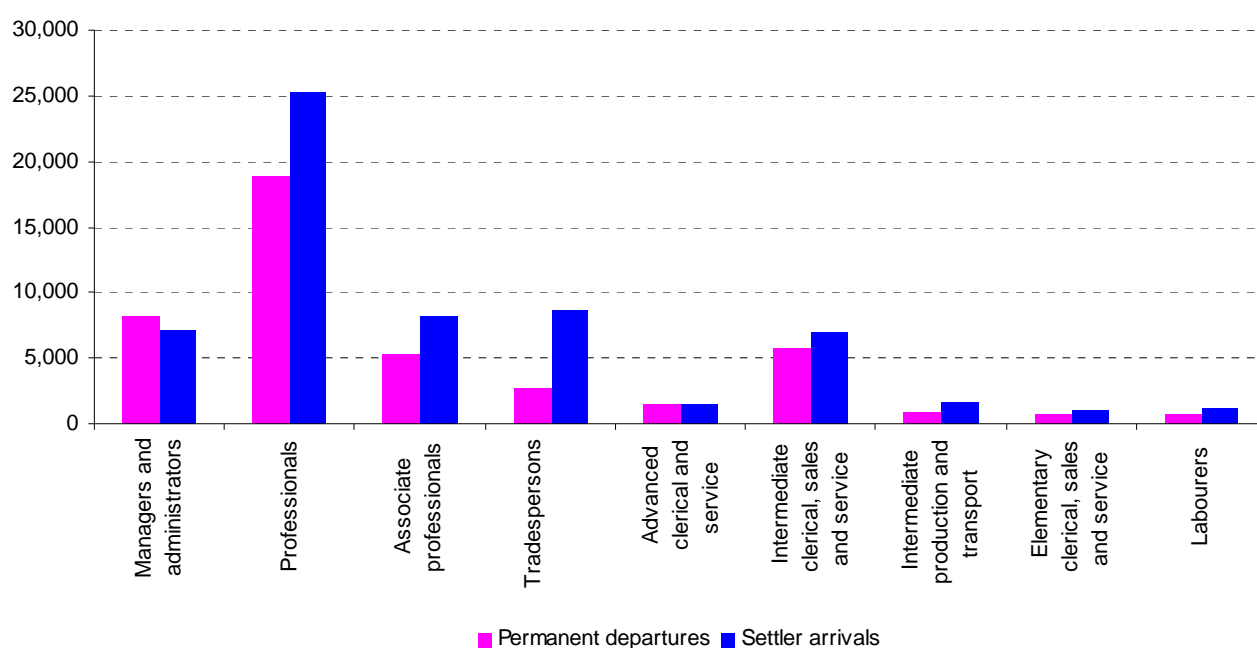
**Table 5 Number of domestic and overseas higher education students by qualification level, Australia, 2007**

	Domestic	Overseas	Total	% overseas
Postgraduate by research	40 267	9 873	50 140	19.7
Postgraduate by coursework	77 088	77 304	154 392	50.1
Other postgraduate	64 206	9 519	73 725	12.9
Undergraduate	557 985	162 018	720 003	22.5
Other	17 201	14 385	31 586	45.5
<b>Total</b>	<b>756 747</b>	<b>273 099</b>	<b>1 029 846</b>	<b>26.5</b>

Source: Department of Education, Employment and Workplace Relations, *Students 2007: Selected higher education statistics*.

Finally, immigration is an obvious way of meeting skills shortages. Worldwide there is a huge amount of trade in labour, either directly through migration or through the labour embodied in the trade of goods and services. As can be seen from figure 7, Australia is part of that trade, particularly among professionals (Australia has been a net importer of skilled professional labour).

**Figure 7** Number of permanent departures and settler arrivals by occupation, Australia, 2006–07 (financial year)



Source: Department of Immigration and Citizenship, *Immigration update 2006–7*.

## Discussion

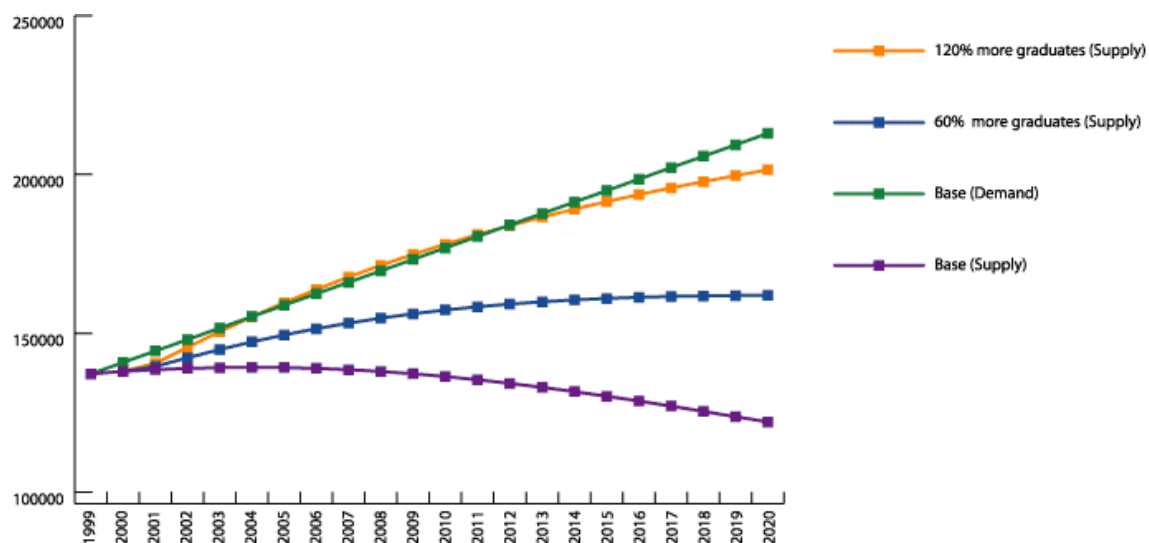
Is this too Pollyannaish? I have been talking at a fairly macro level and I have always argued that micro-level analysis is of more use. I don't think I am being too sanguine about the impact of the impending ageing of the population. Let's take three examples:

- ✧ *Tradesmen*: If there is going to be a shortage caused by demographics, surely this is where it would occur because the trades rely almost totally on young men as entrants. My conclusion, based on a very careful modelling of supply against reasonable demand scenarios, is that there is nothing from the demographic perspective to worry about (Karmel & Ong 2007).
- ✧ *Nurses*: While my work here (Karmel & Li 2002) is a little dated, it illustrates that there may well be occupations where shortages are likely to occur. My projection (see figure 8) is that it seems that there is no way that Australia can produce enough nurses to meet the demand, although we need to be aware that the projections are sensitive to attrition rates. The main point is that such structural difficulties are likely to result in changes in work organisation or how nurses are recruited (we know that there is a very large international trade in nurses).
- ✧ *Hairdressers*: In Australia there have always been chronic shortages. Why? It is nothing to do with the training system; rather, it is about wages and working conditions for those employed as hairdressers. And who cares anyway?

So in each of these examples I find little cause to worry too much about the ageing of the population.



**Figure 8** Projection of registered nurses, allowing for an increase in the number of new graduates, Australia, 2000–2020



Source: Karmel and Li (2002).

## Final comments

I am arguing that there are many ways of resolving potential shortages and that in any case it is hard to see that we need a general expansion in higher education graduates. For example, relative wages have not gone through the roof and we observe that graduates are filtering down to lower-level occupations.

I would not argue, however, that the issue of potential skills shortages should be ignored. We should certainly monitor relative wages and starting salaries and begin to get worried if the wages of some specialties begin to go through the roof. We should also be concerned with those degrees which in some sense are critical (e.g. a balance in medical specialists).<sup>2</sup>

On a different note, we should also acknowledge that skills shortages are not necessarily a bad thing. From a prospective worker's point of view, and arguably from society's point of view, a skills shortage is much preferable to a skills surplus.<sup>3</sup> From a selfish point of view, I would welcome emerging skills shortages. After all, how else are my children, who have either completed university, are part way through or about to commence, going to keep me in the style to which I wish to become accustomed in my old age?

Finally, the current economic crisis, not to mention concerns about climate change, takes the wind out of worrying about a 'skills crunch'. We should keep in mind that the business cycle may well cause more grief than demographic trends.

<sup>2</sup> This is a point well articulated by Sue Richardson in respect of planning for the vocational education and training (VET) sector (Richardson & Tan 2007).

<sup>3</sup> This point is well made by Richardson (2007).

# References

---

- Karmel, T (forthcoming), *Have traineeships increased productivity?*, NCVER, Adelaide.
- & Ong, K 2007, *Will we run out of young men? Implications of the ageing of the population for the trades in Australia*, NCVER, Adelaide.
- & Li, J 2002, 'The nursing workforce 2010', in *National Review of Nursing Education: The nursing workforce*, Department of Education, Science and Training, Canberra.
- Richardson, S 2007, *What is a skill shortage?*, NCVER, Adelaide.
- & Tan, Y 2007, *Forecasting future demands: What we can and cannot know*, NCVER, Adelaide.