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Lifelong learning and older workers

Tom Karmel

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National Centre for Vocational Education Research

1 920896 29 5 web edition

TD/TNC 79.522

Published by
National Centre for Vocational Education Research Ltd
ABN 87 007 967 311

Level 11, 33 King William Street, Adelaide, SA 5000
PO Box 8288 Station Arcade, SA 5000, Australia
<http://www.ncver.edu.au>

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Key messages

- People with higher levels of education qualifications tend to have high levels of engagement with the labour market. The relationship is particularly strong for women.
- Education levels of older cohorts will rise over coming decades as current, relatively well-educated cohorts age. Even with current education participation rates, this should lead to higher rates of engagement with the labour market among older groups, especially for women, than would otherwise be the case.
- This 'education effect' is even more important when working hours patterns are taken into account because the better qualified tend to work more hours (to a large extent because more are engaged in full-time employment).
- The education effect has been important in explaining the current working patterns. For males, the positive education effect has been against a long-term decline in labour force participation. For females, it has contributed to long-term increases.
- The education effect will partially offset the impact of the ageing of the population, but the demographic impact of the ageing population dominates. Factors other than education are also likely to impact on employment-to-population rates, and governments need to concentrate on work incentives and community attitudes as well as education and training, if they wish to increase the proportion of the population working.
- Lifelong learning has a role to play. Qualifications acquired later in life have as good, and in some cases, better, pay-off to employment-to-population rates for older age groups as do qualifications obtained at a young age.
- On the whole, the more qualifications the better, although the evidence on lower-level qualifications and incomplete qualifications improving employment rates is mixed.
- Older people who have undertaken training are more likely to retain their employment status relative to their employed peers not receiving training. So training appears to be helpful to maintaining employment. However, one explanation for this is that employers provide training to those they expect to retain as employees.

Executive summary

Introduction

The ageing of the Australian population and the consequent implications for the workforce have received considerable attention in recent time. In particular, the Australian Government has stressed that the ageing of the population is likely to adversely affect the economy and may compromise future living standards. The government argues that improved labour force participation and productivity will assist in alleviating these potential negative effects, and there is a widespread belief that education and training have key roles to play in this context.

This report uses a quantitative approach to examine the roles of education and training in affecting the participation of older people in the labour market. It uses current and past levels of education, as well as future projections to determine the impact that rising levels of education are having, and will have, on employment rates now and into the future. The report also examines the relationship between the timing of education and training and engagement with the labour market to determine the pay-off to undertaking education and training as an older person compared with undertaking education and training earlier in the lifecycle.

Findings

The relationship between educational level and engagement with the workforce is modelled. The measure of engagement used is the employment-to-population ratio (that is, the number of people employed per head of population). This captures both labour supply and demand factors. Findings indicate that the effect of education on employment-to-population rates is more pronounced for women than men (since it would appear that women undertake educational qualifications in order to re-enter the workforce after family responsibilities have diminished). However, for both males and females, it is evident that a higher level of education appears to have a favourable impact on employment-to-population rates. This impact tends to occur for the higher-level qualifications of certificate III and above. For females, it appears that this 'education effect' is amplified when working-hour patterns are taken into account, as the more educated tend to work longer hours.

Changes in employment rates between 1993 and 2003 are examined in order to assess the relative importance of education levels and sectoral changes. The changes in education levels between 1993 and 2003 indicate large increases in the shares of basic and university-level qualifications. The impact of this increase in qualifications on engagement with the workforce is examined, on an 'everything else being equal' basis. Results indicate that, historically, increasing education levels have been important in explaining current working patterns. Increased education levels, in a purely accounting sense, contributed 1.4 percentage points to the increase in the employment rate for men and 5.5 percentage points for women. Interestingly, when looking at the changes in terms of hours worked, the importance of the education effect increases for both males and females.

For males, the positive education effect has taken place within a context of long-term decline in labour force participation. For females, it has contributed to long-term increases in both labour

force participation and employment-to-population rates. In summary, increasing education levels have played a role in increasing employment rates over the last ten years, especially for women. However, other factors are also important.

In the next section of the report the impact of changing educational levels on employment rates over the next 40 years is estimated. Three separate projections of educational levels are made, in which the acquisition of educational levels is based on the patterns occurring between 1993 and 1998, 1993 and 2003 and 1998 and 2003. The projections of educational qualifications for older people in 2043 suggest that the proportions of older people with low-level qualifications will decline significantly, and that many people will have both university and vocational education and training qualifications. Using the shift-share analysis adopted earlier in the report, the impact of the projected qualifications on employment-to-population rates and hours worked is calculated. The calculations suggest that there will be a positive education effect over the next 40 years, as better educated cohorts age (and continue to acquire qualifications, as has occurred historically). The education effect will partially offset the impact of the ageing of the population, but the demographic impact of the ageing population dominates. It also needs to be noted that the positive education effect implicitly assumes that the labour market will continue to change in a way that demands more educated workers.

In the final section of the report, the effect of the timing of education and training on employment rates is examined, as is the extent to which ongoing education and training improves employment outcomes. Results indicate that qualifications acquired later in life have as good, and in some cases, better, pay-off to employment-to-population rates for older age groups as do qualifications obtained at a young age. This is particularly the case for women. This suggests that education is an effective strategy for older individuals seeking employment.

As well as looking at the timing of qualifications, a series of variables on an individual's engagement with education and training is added to the models. As expected, gaining an additional qualification is positively associated with engagement with the labour market. However, the evidence on incomplete qualifications and future study intent improving employment rates is mixed.

Finally, the extent to which training might provide some insurance against becoming unemployed is examined. The analysis takes everyone who had a wage or salary job in the last 12 months, the number of training courses they completed and whether they are currently employed or not. Although standard errors are generally quite high, there is a positive association between current employment status and training.

Implications of the findings

On the whole, the report indicates that the more qualifications held the better are the employment outcomes. Such results are supportive of the current policy thrust which promotes the notion that high levels of education, lifelong learning and training are beneficial to maintaining and increasing employment rates. The analysis also suggests that education levels of older cohorts will rise over coming decades, as current, relatively well-educated cohorts age. Even with current education participation rates, this will lead to higher rates of engagement with the labour force among older groups, especially for women, than would otherwise have been the case.

Our projections indicate that the education effect will partially offset the impact of the ageing of the population. However, the demographic impact of the ageing population dominates. Factors other than education are also likely to impact on employment-to-population rates and governments need to concentrate on work incentives and community attitudes as well as on education and training if the proportion of the population working is to be increased. As

indicated previously, there is also an implicit belief that the labour market will continue to shift in a direction conducive to more educated workers.

It appears that the push for lifelong learning is somewhat justified. As noted earlier, qualifications acquired later in life have as good, and in some cases, better, pay-off in employment-to-population rates for older age groups as do those obtained at a young age. However, care needs to be taken in extrapolating these findings to individuals who have not chosen to undertake qualifications later in life, because the observations made in this report reflect the personal characteristics of the individuals concerned and the attitude of employers to such individuals. Moreover, the acquisition of qualifications is not a 'treatment' visited on the individual but the outcome of decisions based on the expected costs and benefits of undertaking the qualification.

Findings also indicate that older people who have undertaken training are more likely to retain their employment status relative to their employed peers not receiving training. Thus training appears to be helpful to maintaining employment. However, one explanation for this is that employers invest in those they expect to retain as employees.

Incomplete qualifications and lower-level qualifications do not appear to impact on any group's employment rate, and our results do not suggest that more and more education and training will meet all the challenges that ageing populations face. Nevertheless, it will be somewhat reassuring to policy-makers that there is some evidence to support moves to promote education and training and lifelong learning. Of course, this report does not attempt to examine questions such as the level of resources allocated to entry-level education and training compared with 'lifelong' education and training, and who should pay.

Introduction

The ageing of the Australian population and the implications for the workforce have received considerable popular attention in recent time. For example, the headline story for the *Australian Chief Executive*, 'Population ageing: Workforce implications' featured an article by the Prime Minister, Mr Howard, among others:

> The answer has to be found in increasing workforce participation rates and the obvious place to start is at the mature end of the workforce.
>
> (Howard 2003, p.6)

Similarly, the Australian Government (2004b) in *Australia's demographic challenges*, points to the potential effect that the ageing of the population will have on the economy and on living standards, and argues that the answer lies in labour force participation and productivity (p.1). There is a wide belief that education and training have key roles to play. Indeed, the first chapter of the report focuses on improving the capacity for work, arguing that education and skills are the key to ensuring effective participation (p.3).

Some economists have been inclined to dismiss the concerns with the workforce implications of ageing, pointing to the difficulties that current older workers have if they are displaced from their jobs and arguing that the market will 'sort it out'. Banks's (2004) assessment is that 'many aspects of an ageing Australia will be accommodated automatically by the market' (Banks 2004, p.15), but 'the indications are that the demographic transition will have profound effects on our society and economy that will require judicious planning and timely intervention by all levels of government' (Banks 2004, p.29).

This report examines the role education and training have to play in affecting the participation of older people in the labour market. There are two aspects to the argument. The first is that it is well known that more educated people tend to have higher participation rates, and this effect is amplified among older age groups. At the same time, education levels have been rising and this should act to increase labour force participation rates among older age groups in the future. What we try to do is to quantify this effect and make some projections based on our best guesses of trends in educational qualifications, based on historical and past patterns of education participation.

The second aspect to the argument relates to lifelong learning. We know that the bulk of education occurs at young ages, and this makes sense because this provides the greatest period for a return on the investment. However, lifelong learning has been promoted by governments, based on a view that, with a high rate of technological change, individuals need to retrain over their lifetimes in order to maintain their productivity (and hence their jobs). In this report, we try to put some meat on this line of argument by examining the effect of timing on the return to education. That is, what pay-off, in terms of employment rates, is there to undertaking, say a degree, at the age of 40 years relative to the pay-off at age 20? Similarly, do education and training provide some sort of insurance against unemployment for older workers?

The first section of the report looks at the relationship between employment rates and education and training. The second looks at changes in employment rates between 1993 and 2003 in order to ascertain the relative importance of education levels and sectoral changes. The third estimates the impact of changing educational levels on labour force projections in the context of the ageing

population over the next half-century. In the fourth section we turn to the lifelong learning aspects of the report by examining the relationship between timing of education and training, and the extent to which ongoing education and training improve employment rates. Finally, some conclusions are drawn.

1 Relationship between employment and level of education

Our primary interest in this report is the relationship between education level and engagement in the workforce. So the immediate way to proceed would be to model labour force participation. However, it is well known that labour force participation does not really capture the full extent of people who would like to work, because of the number of 'discouraged workers' who do not appear in the standard definition of the labour force; nor does it capture the propensity of employers to hire workers. Hence, it seems preferable to model the employment rate, which is taken to represent the outcome of the supply decisions of individuals and the demand decisions of employers. After all, policy is directed at getting people into employment, not unemployment. There is another dimension which needs to be discussed. This is the amount (number of hours) of employment being undertaken. Part-time employment is becoming increasingly important but does not have the same impact on incomes (and hence dependency ratios) as full-time employment.

We take a straightforward approach and run simple cross-tabulations within age and gender groups. There is every reason to believe that the relationship between education and employment will be quite different between males and females and across age groups. We use categorical variables to capture educational levels rather than 'years of schooling' used in standard wage equations. This is for two reasons. The theoretical reason is that it is difficult to order education levels, especially when comparing vocational certificates and Year 12. The second is a practical one: our data source provides education levels, not years of schooling and imputing the years would introduce considerable measurement error. For example, a postgraduate degree can take anything from one year to four or five. Similarly, certificates can vary considerably in length.

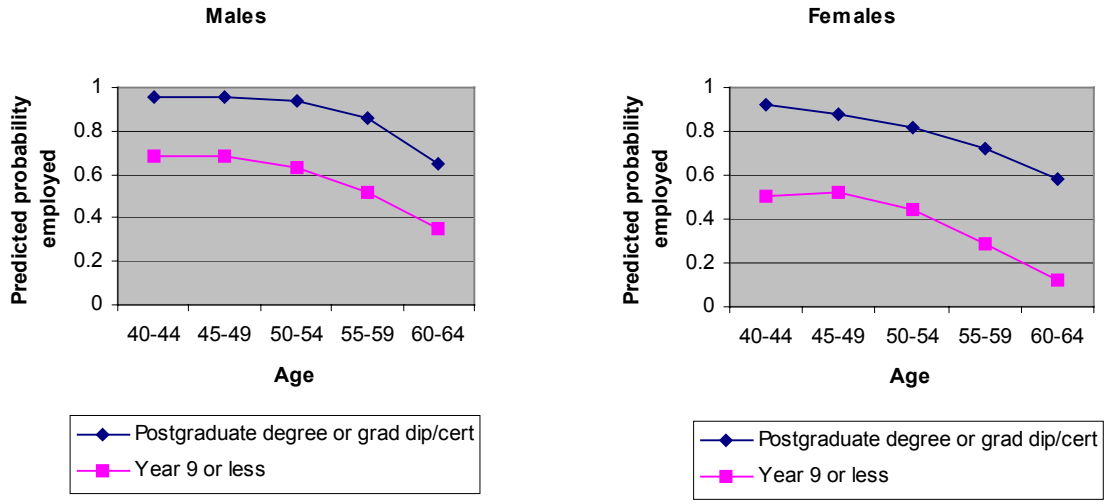
The data we use come from the Australian Bureau of Statistics' (ABS) Survey of Education and Training Experience, 2001. This survey has the richest set of educational data and is also conducted by personal interview (and hence should be more accurate than either the census or labour force survey).

Our first task is to decide on the educational categories. These are taken from the current ABS classification ASCED (Australian Standard Classification of Education). However, we modify it because it is problematic to put all post-school qualifications above Year 12. For example, certificates I and II can be completed while at school and, in terms of difficulty, could not really be thought of as 'higher' than completing Year 12.

The ABS data allow us to cross-classify post-school (or non-school in the latest ABS jargon) qualifications by year or age left school. Examing the data indicates that there are differences between, say, a certificate I or II after completing Year 12 and the same level certificate after completing fewer years of schooling. However, the data are somewhat sparse in some age groups so we combine some of the years of schooling categories to maintain reasonable sample sizes. Appendix A contains the data.

To make the patterns easier to see we run logistic regressions to smooth out the fluctuations (appendix B). The resultant models are shown in figures 1 and 2. The first figure shows quite starkly the impact of education levels on employment rates by plotting the employment rates for the two extremes of the education distribution: postgraduate degrees compared with those who have no post-school qualifications and left school at Year 9 or earlier. While the differences are greater for women than men, they are very significant for both.

Figure 1: Impact of educational level on employment of older people, 2001: educational attainment of postgraduate degree or graduate diploma or certificate and Year 9 or less



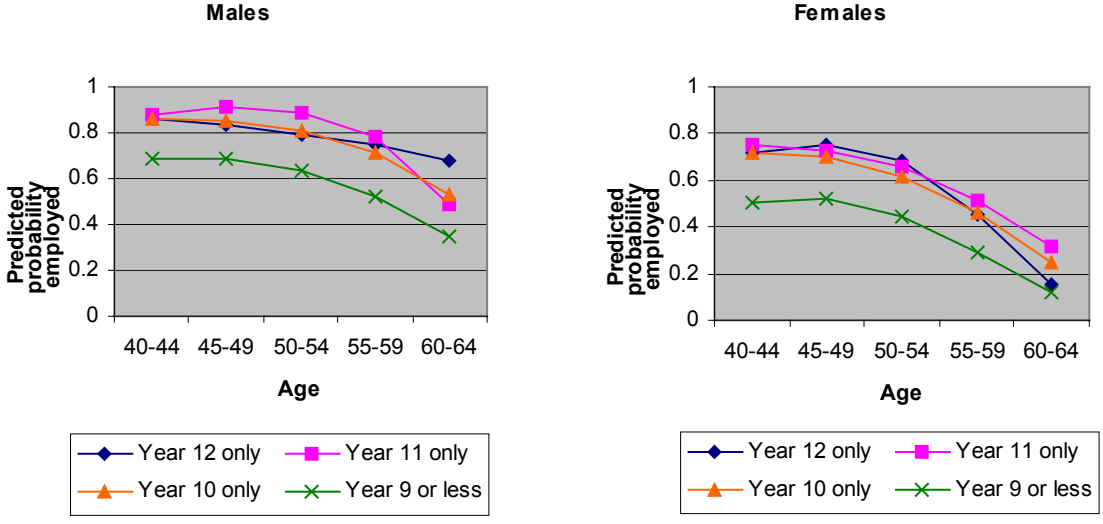
Source: Derived from the ABS Survey of Education and Training Experience, 2001

Figure 2 plots the employment rates for various combinations of educational qualifications. The main points to emerge are:

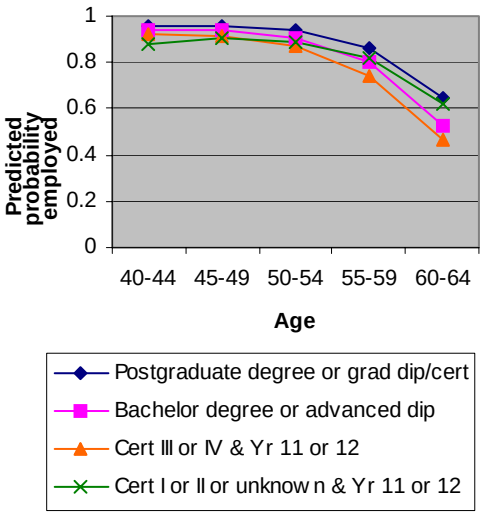
- On the whole, for a given age, employment rates rise with increased education levels.
- The impact of education is more pronounced for women, especially at younger as well as older ages. Education clearly affects family formation patterns.
- There is a fair amount of variation in employment rates for people with no non-school qualifications. Those with Year 9 or less have particularly low rates of employment.
- For males, most of the differences in employment rates tend to become evident only at older age groups.
- For people with a certificate, level of secondary education has an impact on employment rates for some groups (especially younger women [see figure A1, p.41], but also prime age men with certificates I or II).
- For men, possession of a certificate I or II is associated with lower employment rates relative to Year 12.

To sum up, a crude characterisation is that more years of schooling the better, with the effect on employment rates more pronounced for women.

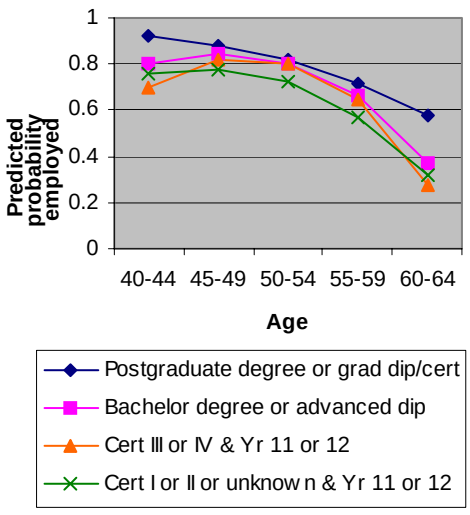
Figure 2: Impact of educational level on employment of older people, 2001



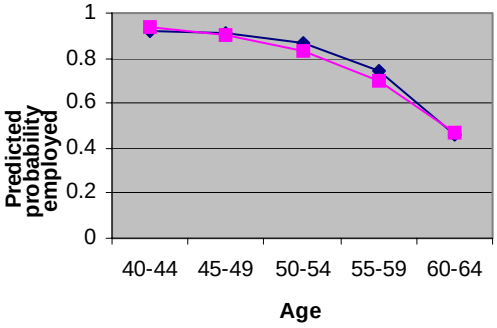
Males

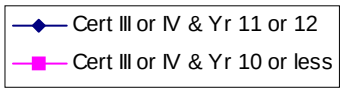


Females

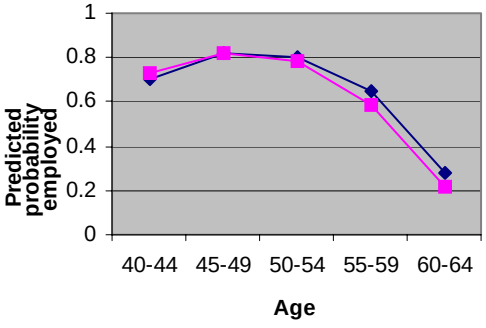


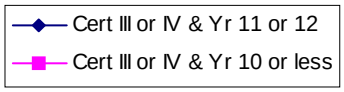
Males



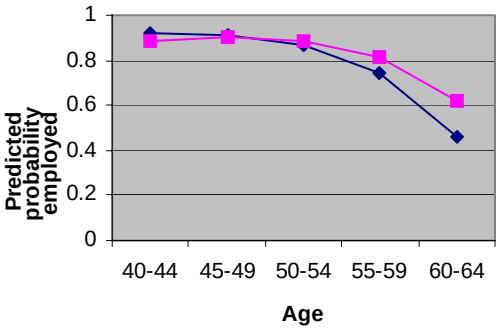


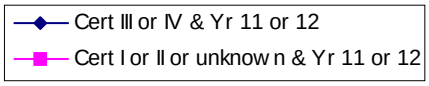
Females



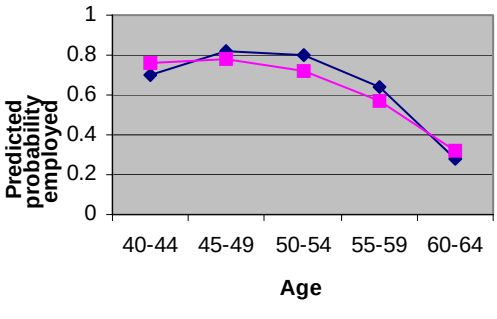


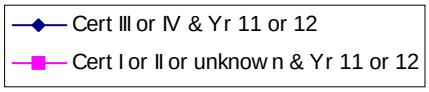
Males

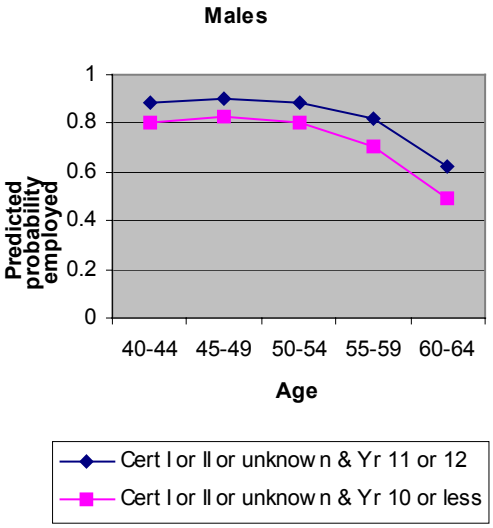


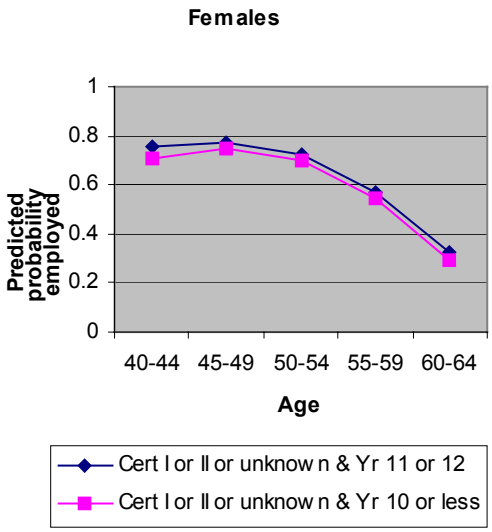


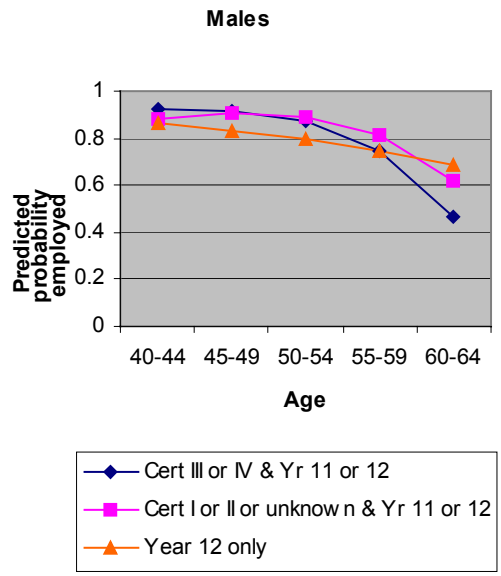
Females

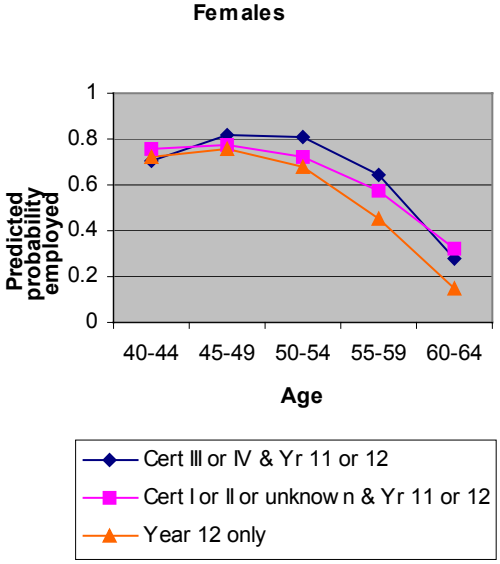










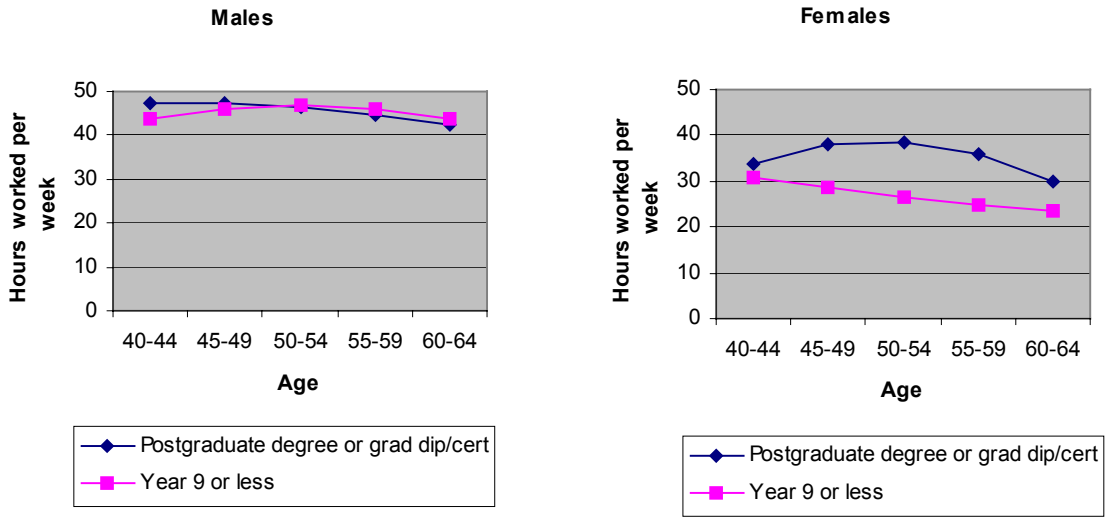


Source: Derived from the ABS Survey of Education and Training Experience, 2001

Number of hours worked

We now turn to hours worked. As expected, the average number of hours worked per week differed for males and females (see appendix C). As before, we run regressions to smooth out the fluctuations (appendix D). Figure 3 indicates that there are only minor differences in the number of hours worked per week between males who attained the highest possible level of education and males who attained the lowest possible level of education, for those aged 35–39 and above. By contrast, most females who attained the highest level of education worked a greater number of hours per week compared with females who attained the lowest level of education.

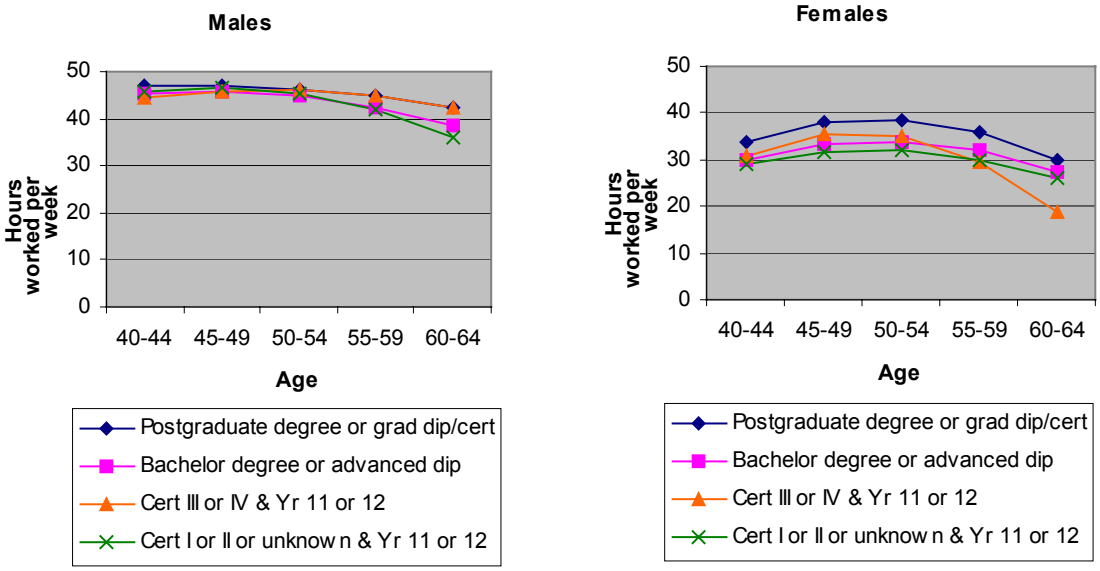
Figure 3: Impact of educational level on hours worked per week of older people, 2001: educational attainment of postgraduate degree or graduate diploma or certificate and Year 9 or less

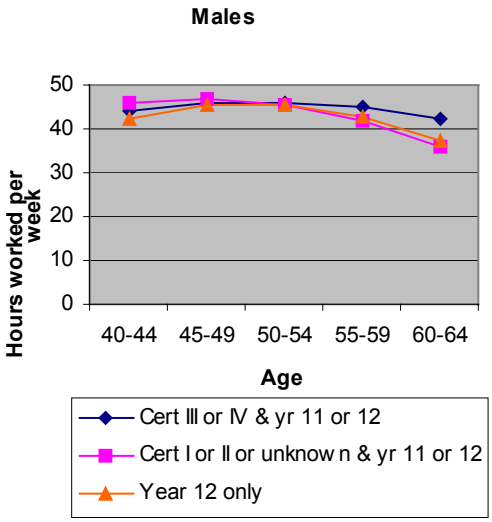


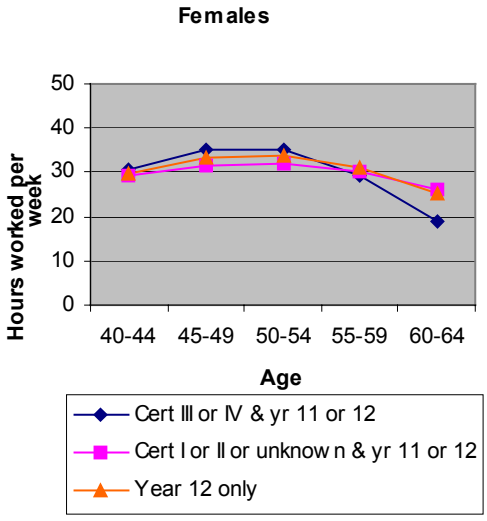
Source: Derived from the ABS Survey of Education and Training Experience, 2001

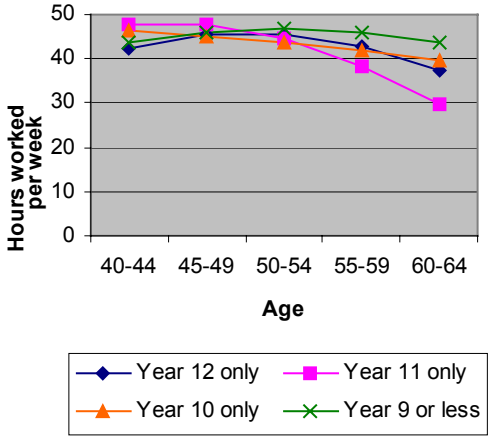
Figure 4 looks at hours worked in more detail. For women, those with a postgraduate award tend to work longer hours (that is, most likely to be more full-time workers), but differences between the other educational categories are less clear. For men, the differences are not particularly apparent.

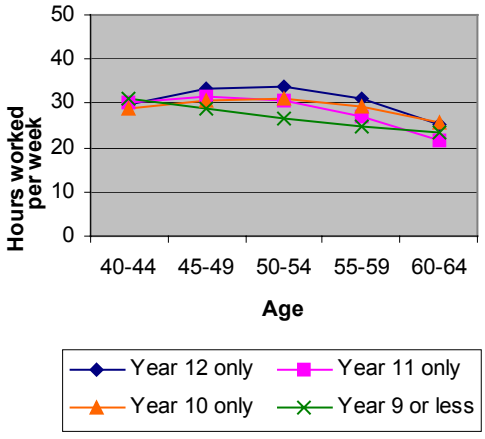
Figure 4: Impact of educational level on employment of older people, 2001











Source: Derived from the ABS Survey of Education and Training Experience, 2001

2 Changes over time

One of the noticeable features of recent decades has been the increase in overall education levels. The issue we wish to look at is the impact this has had on employment rates. From the previous section we know that people with higher-level qualifications tend to have a greater degree of engagement with the labour market. Therefore, everything else being equal, we would have expected employment rates to rise. However, other factors have come into play, particularly sectoral changes in retirement patterns (reflecting both supply and demand factors). In this section we deconstruct the changes in participation in order to get a feel for the relative importance of the various factors. We use a standard shift-share approach as follows:

Define E as employment, N as population

i refers to age, sex cells

j refers to education level

Then $\frac{E}{N}$ can be written as

$$\frac{E}{N}=\sum_{i,j}\frac{E_{ij}}{N_{ij}}\frac{N_{ij}}{N_{i.}}\frac{N_{i.}}{N_{..}}$$

where the dot refers to summation over that subscript.

Taking percentage changes we get

$$\%\Delta\frac{E}{N}=\sum_{i,j}W_{ij}\,\%\Delta\frac{E_{ij}}{N_{ij}} \qquad (1)$$

$$+\sum_{i,j}W_{ij}\,\%\Delta\frac{N_{ij}}{N_{i.}} \qquad (2)$$

$$+\sum_{i}W_{i.}\,\%\Delta\frac{N_{i.}}{N_{..}} \qquad (3)$$

where $W_{ij}=E_{ij}/E..$

(1) is described as the employment effect
(2) is described as the education effect
(3) is described as the demographic effect.

The interpretation of the three effects is straightforward. The demographic effect captures changes in the employment rate due to the changing age profile of the population. The education effect measures the increase in the overall employment rate which can be attributed to increasing education levels—because more educated people, everything else being equal, tend to have a higher employment rates. The employment effect is best thought of as a sectoral change variable.

It is the change that has occurred after taking out demographic shifts and changes in education levels. It could be measuring changes in employer preferences, or the impact of superannuation changes on the desire to work or a myriad of other factors.

The shift-share analysis can be generalised to also account for hours of work, as follows.

Let *H* represent total work hours. Then we can write

$$\frac{H}{N} = \sum \frac{H_{ij}}{E_{ij}} \frac{E_{ij}}{N_{ij}} \frac{N_{ij}}{N_{i.}} \frac{N_{i.}}{N_{..}} \text{ and}$$

$$\%\Delta \frac{H}{N} = \sum_{i,j} V_{ij} \%\Delta \frac{H_{ij}}{E_{ij}} \qquad (4)$$

$$+ \sum_{i,j} V_{ij} \%\Delta \frac{E_{ij}}{N_{ij}} \qquad (5)$$

$$+ \sum_{i,j} V_{ij} \%\Delta \frac{N_{ij}}{N_{i.}} \qquad (6)$$

$$+ \sum_{i} V_{i.} \%\Delta \frac{N_{i.}}{N_{..}} \qquad (7)$$

where $V_{ij} = H_{ij} / H..$

The interpretation of (4) to (7) is pretty much as before, except we are now thinking of labour in terms of hours rather than people. The equation (4) is an hours effect, representing the impact of changes in average hours. The equations (5)–(7) are analogous to (1)–(3), the only difference being that the qualification by age categories are weighted by share of hours rather than by share of people.

To look at the role of the effect of changing levels of education on changes in employment rates historically, we turn to the Survey of Education and Work and, the earlier survey, the Transition from Education to Work[1]. For this piece of analysis we have to map the education classifications that have changed over 1993–2003, the period being examined (see appendix E). Appendix F contains the data.

The first point to note is that the changes in education levels for older age groups have been very large indeed. Table 1 shows the change in the education shares of the older age groups.

[1] While the richer survey of Education and Training Experience has been conducted a number of times, its scope has changed. Only the 2001 survey covers the whole working-age population.

Table 1: Change in highest educational qualification shares, for older age groups (per cent), 1993–2003

	40–44	45–49	50–54	55–59	60–64
Males					
No Year 12	-15.3	-18.3	-23.3	-18.5	-16.7
Year 12	-17.6	-2.8	-12.4	-29.3	-35.2
Basic	85.8	84.7	69.2	103.6	105.4
Skilled	8.1	-8.3	-10.4	-21.6	-5.1
Associate diploma	-67.4	-62.1	-61.0	-63.8	-93.8
Undergraduate diploma/ bachelor degree	26.6	52.9	68.5	93.2	87.4
Higher degree/postgraduate diploma	21.0	18.2	61.7	81.0	71.1
Females					
No Year 12	-30.4	-28.1	-18.6	-14.2	-8.5
Year 12	-20.0	-28.9	-37.9	-54.6	-68.3
Basic	12.3	13.3	35.1	56.2	50.8
Skilled	31.2	4.3	5.7	9.6	-63.5
Associate diploma	36.9	20.7	2.6	17.7	51.1
Undergraduate diploma/ bachelor degree	39.3	53.3	32.3	48.0	82.8
Higher degree/ postgraduate diploma	44.4	69.3	111.7	93.6	95.8

Source: Derived from ABS Survey of Education and Work, 2003 and Transition from Education to Work, 1993

The shares with no post-school qualifications have declined, offset by very large increases in the shares with both basic qualifications and university-level qualifications. Interestingly, the share with qualifications described by the Australian Bureau of Statistics as 'skilled' (such as trades qualifications) has declined.

However, the issue for us is what this increase in qualification levels means for engagement with the labour market. Based on the shift-share analysis outlined earlier, the answer is a modest increase for males and a more substantial increase for females (table 2). The table shows that increased education levels contributed 1.4 percentage points to the increase in the employment rate for men but 5.5 percentage points for women[2]. This compares with 4.2% and 7.8%, respectively, for the 'employment effect' that holds the demographic structure and education levels constant, indicating that, over this period, the larger portion of the changes in employment rates can be attributed to labour supply and demand changes over and above changes in education levels.

To provide further context, we place these changes in a longer time frame.[3] From the Labour Force Survey, we can see that the increase in the employment rate for men over the last decade is against even larger declines between 1978 and 1993. For women, by contrast, the increase is part of the longer-term trend. Table 3 also shows that, especially for older women, there is plenty of scope for further increases.

[2] In order to minimise linearisation errors we value the percentage points at the midpoints. Weights are also calculated at midpoints. This is quite important because of the magnitude of changes.

[3] Banks (2004) provides a much longer perspective and makes the point that current levels of labour force participation are historically very high.

Table 2: Decomposition of changes in the employment rate, 1993–2003

	Males	Females
1993 employment rate	0.74	0.56
2003 employment rate	0.78	0.64
Education effect (percentage points)	1.4	5.5
Employment effect (percentage points)	4.2	7.8
Demographic effect and interactions (percentage points)	-0.1	-0.2
Total change in employment rate (percentage)	5.6	13.1

Source: Derived from the ABS Survey of Education and Work, 2003 and Transition from Education to Work, 1993

Table 3: Employment rates for various age groups, 1978–2003

	45–54 years	55–59 years	60–64 years	15+ years
Males				
1978	0.89	0.82	0.60	0.75
1983	0.85	0.74	0.44	0.70
1993	0.82	0.62	0.41	0.64
2003	0.84	0.71	0.48	0.68
Females				
1978	0.44	0.29	0.12	0.39
1983	0.45	0.27	0.12	0.40
1993	0.60	0.34	0.14	0.46
2003	0.71	0.50	0.26	0.53

Source: ABS Labour Force Survey

It is worth noting that the increase in the employment-to-population rates for males over the last decade is at variance with the conventional wisdom that males' engagement with the labour market has been declining (see for example, Preston & Burgess 2003). The reason for this divergence with the conventional view is that, over the 1990s, employment-to-population rates for males have been increasing, while labour force participation rates have been decreasing (not what one would expect from basic labour economics). By contrast, the employment-to-population rates and labour force participation rates have been moving in the same direction for women.

Table 4: Labour market indicators, people aged 15+ years, February, various years

Males	**1978**	**1983**	**1993**	**2003**
Unemployment rate (%)	6.2	10.0	12.7	6.7
Participation rate (%)	80.1	77.6	73.8	72.5
Employment to population ratio	0.75	0.70	0.64	0.68
Females				
Unemployment rate (%)	9.7	11.8	11.4	6.7
Participation rate (%)	43.7	44.9	51.7	56.8
Employment to population ratio	0.39	0.40	0.46	0.53

Source: ABS Labour Force Survey

To this point, we have concentrated on the changes in the proportion of people working.

We can supplement this by looking at the hours people work. From the Surveys of Education and Training Experience we have the hours people work. This enables us to supplement the earlier shift-share analysis, exploiting the somewhat more complicated formulae (4), (5), (6) and (7). By combining the data on changes in education levels from the Survey of Education and Work and Transition from Education to Work and the hours data from the Survey of Education and Training Experience we get components as in table 5.

Table 5: Decomposition of changes in the average number of hours per head of population[4], 1993–2003 (people 15–64)

	Males	Females
1993 hours per head of population	31.0	17.0
2003 hours per head of population	33.0	18.8
Education effect (percentage points)	2.4	7.6
Employment effect (percentage points)	3.9	6.5
Hours effect	2.8	-3.7
Demographic effect and interactions (percentage points)	-2.8	0.1
Total change in hours per head (percentage)	6.3	10.5

Source: Derived from the ABS Survey of Education, 2003 and Work and Transition from Education to Work, 1993

A couple of points emerge from this table. The first is that, on average, males are working longer hours; females are working shorter hours (reflecting changes in mix of full-time/part-time workers, as well as length of hours of those working full-time). The other point is that the importance of the education effect increases when looking at hours of work rather than numbers of people working. Clearly, the education categories that have grown in importance tend to be those where average working hours are longer. On the whole, the more educated tend to work longer hours.

Three main points emerge from the above analysis. First is that over a long period there have been very considerable changes in employment rates. Second, there is an unmistakable positive trend for women, but the trend for men is ambiguous, with large declines between 1978 and 1993 being somewhat offset in the last ten years. This is against a long-term decline in the labour force participation rate of men. Finally, increasing education levels have played a role in the increasing employment rates over the last ten years, especially for women, but other factors are also important.

[4] As noted in the text, this analysis is compiled using two data sources. The education and employment effects are derived from changes between 1993 and 2003 (Survey of Education and Work), weighted by the distribution of hours from the 2001 Survey of Education and Training Experience. The hours effect is based on changes between the 1993 and 2001 Surveys of Education and Training Experience, using the average hours over these two surveys for the weights. This effect uses a slightly coarser age split-up because the data were not available for 55–59 and 60–64 years for one of the surveys. The hours per head figure comprises 1993 and 2001 average hours per employed person (Survey of Education and Work Experience) with the employment-to-population ratios from the 1993 and 2003 Surveys of Education and Work.

3 The outlook

There has been considerable work done by the Treasury on the impact of the ageing of the population on dependency ratios. Gruen and Garbutt (2003) took into account impacts of changing education levels in some of their projections and argued that current education levels can be expected to significantly raise labour force participation rates in coming years for middle-aged and older people, especially females (as the better educated cohorts age). Their methodology was based on census data and assumed that future education levels would be the same as current cohorts. That is, they assumed that 2001 education levels of 27-year-olds (36-year-olds for those with higher degrees) represent the education levels of older cohorts in the future.

Our approach differs in two respects. First, we use the richer data available from the Survey of Education and Work and Transition from Education to Work. Second, we project educational levels by taking educational levels as in 2003 but then assuming that the rate educational qualifications are acquired reflects the patterns that we observed by cohorts between 1993 and 2003. Gruen and Garbutt's approach incorporates the concept of lifelong learning and allows people's education levels to rise over their lifetimes. This approach, of course, makes the heroic assumption that the rate of acquisition remains constant. However, this assumption is consistent with the current policy drive emphasising lifelong learning.

There is a technical difficulty with our approach caused by the fact that the number of transitions we have to estimate is greater than the number of observations, because we are using synthetic cohorts rather than longitudinal data. Our approach to overcome this difficulty is outlined in appendix G. Suffice it to say that our transition probabilities are plausible and consistent with the observed outcomes. We look at the robustness of our projections by using the transitions for 1993–2003, 1993–1998 and 1998–2003. The projections are done for 2043, by which time the transitions historically would have washed out (that is the 25-year-olds would be 65 years old). In a crude sense these projections can be interpreted as the steady state that would occur, given current educational participation rates.

Table 6 contains the resulting projections, together with the 2003 data.

It can be seen that there is a lot of movement in these projections. The proportions of older-age groups with low-level qualifications declines significantly, and very high proportions of older-age groups will acquire degrees and postgraduate degrees over their lifetimes if current rates of acquisition continue. The numbers with vocational-level qualifications decline because these projections are based on a 'highest educational qualification' concept. Many people will have both university and vocational education and training qualifications.

Table 6: Distribution of educational qualifications for older people 2003 and 2043

	40–44 years	45–49 years	50–54 years	55–59 years	60–64 years
Males, 2003					
No Year 12	0.27	0.28	0.31	0.36	0.41
Year 12	0.10	0.10	0.10	0.08	0.07
Basic	0.06	0.06	0.05	0.07	0.06
Skilled	0.26	0.25	0.22	0.23	0.23
Associate diploma	0.05	0.05	0.05	0.04	0.02
Undergraduate diploma/ bachelor degree	0.18	0.19	0.19	0.17	0.15
Higher degree/ postgraduate diploma	0.07	0.07	0.09	0.06	0.05
Males, 2043					
No Year 12	0.13	0.13	0.12	0.13	0.12
Year 12	0.12	0.11	0.09	0.08	0.06
Basic	0.10	0.11	0.10	0.14	0.13
Skilled	0.23	0.21	0.22	0.18	0.21
Associate diploma	0.04	0.03	0.02	0.02	0.01
Undergraduate diploma/ bachelor degree	0.25	0.27	0.26	0.23	0.22
Higher degree/ postgraduate diploma	0.14	0.13	0.18	0.23	0.25
Females, 2003					
No Year 12	0.35	0.37	0.46	0.52	0.60
Year 12	0.11	0.11	0.09	0.09	0.07
Basic	0.12	0.12	0.11	0.11	0.10
Skilled	0.07	0.05	0.05	0.05	0.03
Associate diploma	0.06	0.05	0.04	0.04	0.02
Undergraduate diploma/ bachelor degree	0.22	0.22	0.17	0.14	0.15
Higher degree/ postgraduate diploma	0.07	0.08	0.07	0.05	0.03
Females, 2043					
No Year 12	0.10	0.13	0.21	0.15	0.10
Year 12	0.14	0.13	0.08	0.07	0.05
Basic	0.09	0.10	0.10	0.14	0.09
Skilled	0.06	0.05	0.06	0.03	0.03
Associate diploma	0.10	0.09	0.07	0.02	0.04
Undergraduate diploma/ bachelor degree	0.34	0.35	0.30	0.28	0.30
Higher degree/ postgraduate diploma	0.17	0.16	0.19	0.31	0.38

Source: Derived from the ABS Survey of Education and Work, 2003 and Transition from Education to Work, 1993 (see appendix E)

Once we have the projections, it is a simple matter to calculate the impact of the projected increase in educational qualifications on the employment-to-population ratio, assuming that the

employment-to-population ratio remains the same within age groups and educational qualification categories, using (2) in the shift-share analysis used earlier in the report.[5]

This education effect is shown in table 7, using the three projections based on 1993–2003, 1993–1998 and 1998–2003 transitions, respectively.

Table 7: Education effect, 2003–2043 based on 2003 employment weights (percentage increase in employment to population rate of 15 to 64-year-olds)

	Males	Females
Projection 1 (1993–2003 transitions)	2.0	7.3
Projection 2 (1993–1998 transitions)	1.5	7.2
Projection 3 (1998–2003 transitions)	2.6	8.6

Source: Derived from the ABS Survey of Education and Work, 2003, Transition from Education to Work, 1993 and Transition from Education to Work, 1998

These calculations suggest that, without any increase in current patterns of educational participation, employment-to-population ratios will increase for the working-age population, everything else being equal. We can do a similar series of calculations based on changes in hours worked per head. These calculations are shown in table 8.

Table 8: Education effect, 2003–2043 based on 2001 hours worked weights (percentage increase in hours worked per head of population of 15 to 64-year-olds)

	Males	Females
Projection 1 (1993–2003 transitions)	4.4	10.1
Projection 2 (1993–1998 transitions)	7.5	13.7
Projection 3 (1998–2003 transitions)	4.6	8.1

Source: Derived from the ABS Survey of Education and Training Experience, 2001, Survey of Education and Work, 2003, Transition from Education to Work, 1993 and Transition from Education to Work, 1998

Of course, these calculations need to be interpreted against the demographics to which we now turn. The whole interest in trying to increase labour force participation is driven by changes in demographics that will greatly increase the number of older people who, under current social patterns, are not considered part of the working-age population. We use standard ABS population projections, and apply our shift-share formulae. We make one modification to the previous shift-share approach by looking at changes in employment rates and working hours per person based on the whole population rather than the working-age population. This modification is incorporated in our formulae by separating the demographic changes in the working-age population (15–64 years) from the change in ratio of the working-age population to the whole population.[6] The calculations are done for the three ABS projections (ABS 2003). Note that the education effect in this table uses projection 1 from the earlier tables.

[5] For the projections we use percentage change calculated from the 2003 base and, to be consistent, the 2003 weights.

[6] If we denote N as working-age population and P as the whole population we write $P=(P/N)N$ then the shift-share formula can be simply expanded to decompose percentage changes in the employment rate of the whole population and the working hours per head of the whole population.

Table 9: Changes in employment rates and working hours per person attributable to education and demographic change, 2001 to 2041 (2003 employment weights, 2001 hours weights)

	Employment rate	Working hours per person
Males		
Education effect (% points)	2.0	4.4
Demographic effect (2041)		
-within working-age population (% points)	(A) -1.1 (B) -1.0 (C) -1.0	(A) -1.6 (B) -1.3 (C) - 1.0
-balance between working-age population and whole population (% points)	(A) -12.5 (B) -10.2 (C) -10.6	(A) -12.5 (B) -10.2 (C) -10.6
Females		
Education effect (% points)	7.3	10.1
Demographic effect (2041)		
-within working-age population (% points)	(A) -2.3 (B) -2.4 (C) -2.7	(A) -2.9 (B) -3.0 (C) -3.3
-balance between working-age population and whole population (% points)	(A) -13.4 (B) -11.4 (C) -12.2	(A) -13.4 (B) -11.4 (C) -12.2

Source: Derived from the ABS Survey of Education and Work, 2003, Transition from Education to Work, 1998 and Population projections, Australia, 2002–2101

Our conclusion is that increasing educational levels resulting from the ageing of current cohorts are of some substance and will to some extent offset the ageing of the population. However, even under the most optimistic demographic projection, the education effect is less than the demographic effect.

It needs to be kept in mind that what we have done is purely an accounting exercise. The approach assumes that the education effect and employment effects are independent. That is, it is assumed that increasing the proportion in an age group in a particular (higher) educational category will not impact on the employment rate in that category. This is consistent with the idea that the labour market is changing in a way to accommodate increasing educational levels. However, this appeared to have happened in the historical period considered earlier and therefore, it seems reasonable to assume that the trend will continue. Changes in employment rates within age and educational categories were reasonably large in the period 1993 to 2003 and there is no reason that such changes cannot continue to occur. There appears to be a long-term trend for women's labour force participation to increase (over and above that driven by increased education levels), driven by changes in social expectations. The expected low growth in the labour force is also expected to reinforce this trend (Austen & Giles 2003), and changes in government family policies may assist the trend.[7] For men, we saw that employment-to-population rates increase over this period, no doubt at least in part because of the buoyant economic conditions over the 1990s. The popular view is that there will be a labour shortage as the population ages. If this is the case, there would be every reason to believe that the employment rates can increase for men. And certainly, the government has given every indication that superannuation and welfare rules will provide greater incentive to work (Australian Government 2004a). All these factors provide comfort to the thesis that the education effect we have projected is not wishful thinking, and perhaps there is a reason to be optimistic that there will also be an additional employment effect (that is, increasing employment rates within age by educational categories).

[7] For example the OECD (Burniaux, Duval & Jaumotte 2004, p.58) argues that an increase in childcare expenditure to the OECD average would increase the labour force participation of women aged 25–54 years, 2025 by 3.0 percentage points.

While our analysis has been restricted to the conventional working-age population (15–64 years), there must be a high possibility that more people will engage in some work after they pass 65 years, given the increases we have seen in life expectancy.

The other trend that provides some comfort to our projection of the education effect is the nature of changes to the labour market in recent years which have clearly favoured better educated individuals. If this change continues, then the relatively high employment rates of the better educated can be expected to be maintained, even though the proportion of the workforce with higher-level qualifications will increase. But the point remains that the education effect is a projection, not a prediction. Its size, however, underlines the points that there is a sizeable kick in the relationship between employment rates and education levels, and that average education levels are being transformed by the current level of education participation.

4 Where does lifelong learning come in?

We have seen that people with higher-level educational qualifications tend to have a higher rate of engagement with the labour market. However, a further question is whether 'lifelong learning' itself promotes engagement with the labour market. It could be the case, for example, that it is entry-level training which sets an individual on a certain course in the labour market. Alternatively, education and training later in life might assist those with a poorer hold on the labour market or provide scope for a second (or third career) which will enable or motivate a person to remain longer in the labour market than otherwise would have been the case.

In this context, we consider how the timing of study affects labour market engagement, again making use of the ABS Survey of Education and Training Experience. That survey provides details on current study and the three highest qualifications held. In relation to the latter, the survey asked the date of completion of qualifications.

We build on the earlier work and focus on the non-school qualification categories. One way of approaching the problem would be to allow the impact of timing of qualifications to vary with age and educational category (as well as sex). This however would generate a large number of models and stretches the sample. The more parsimonious approach we adopt is to fit models within each educational category. That is, whether or not an individual is employed is modelled as a function of age and age (squared) interacted with educational category and time since completion of the educational category, again interacted with educational category. Interactions between age and time since completion are also included to allow for the likelihood that obtaining a degree at age 40 is a very different situation from obtaining one at age 60. We also restrict the observations to people over the age of 40, since we are interested primarily in what assists older people in maintaining engagement with the labour market.[8]

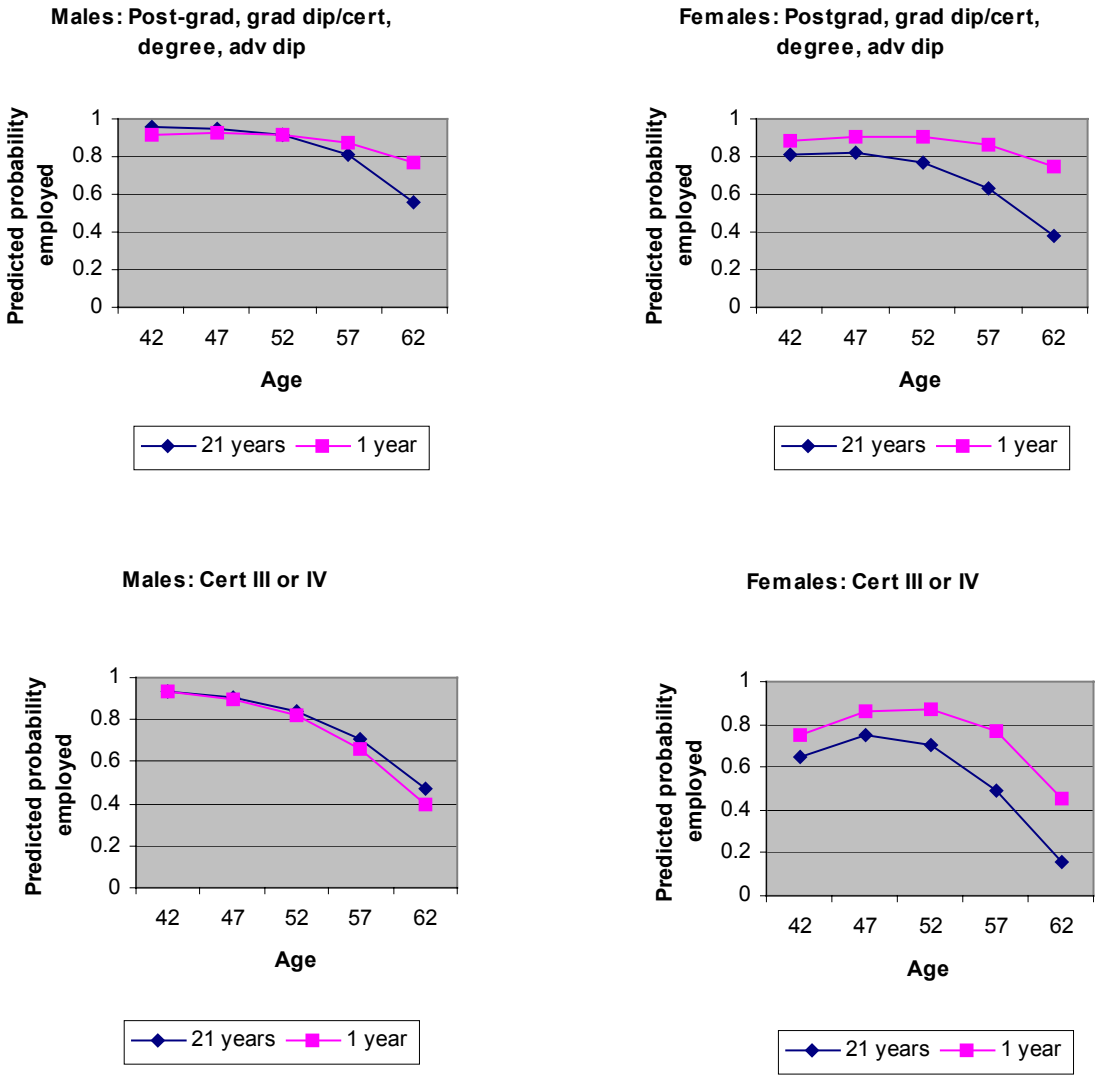
Even with a survey as large as the Survey of Education and Training Experience, the number of observations limits the analysis. In order to get sufficient observations, we collapse the educational categories into high (postgraduate, degree, advanced diploma), medium (certificates III and IV) and low (certificates I and II). The results (appendix H) are quite interesting and provide solid support for the view that educational qualifications gained later in life are indeed helpful in maintaining engagement with the labour market (figure 5). This finding is consistent with research conducted in the United Kingdom. Jenkins et al. (2002) found, using longitudinal data, that those who were out of the labour market in 1991 were more likely to be in the labour market in 2000 if they had participated in lifelong learning (defined as learning between the ages of 33 and 42 resulting in a qualification).

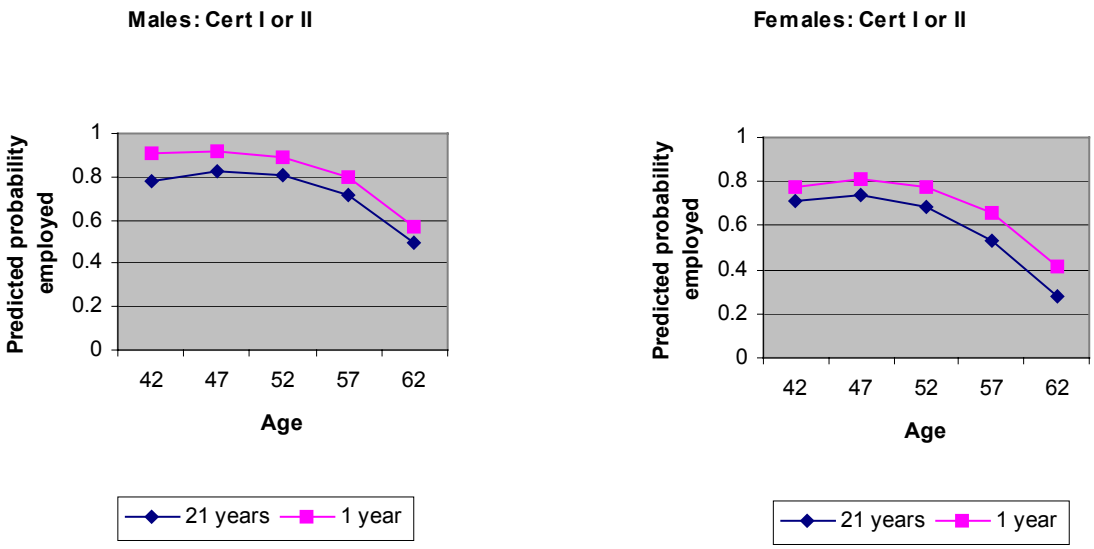
For males, a high-level qualification attained as a person approaches 60 appears to promote continued employment. Acquisition of low-level qualifications is also helpful, but over a broader age range. By contrast, timing of middle-level qualifications does not seem to have much impact on employment rates. For women, the results are stronger. A consistent result is obtained for each qualification level: those who have more recently acquired a qualification have much higher

[8] The survey provides time bands for when qualifications are obtained, with the earliest one being prior to 1980. The variable representing years since qualification was coded to 21 for people reporting that their highest qualification was obtained within that band. The regression results are shown in appendix I.

employment rates. It would seem that a qualification is an effective strategy for obtaining or keeping employment. While the survey does not provide us with an explanation for this finding, it would seem that women whose engagement with the labour market is low during the years of family formation find that obtaining an educational qualification is an effective way of getting back in the labour market. For men, obtaining a qualification is more a strategy for maintaining engagement with the labour market. Of course, we don't know whether those who have chosen not to upgrade their qualifications would have been more successful in maintaining their employment if they had upgraded their qualifications. The acquisition of qualifications is not a 'treatment' randomly assigned to people. Rather, it reflects individual characteristics and perceptions of employment prospects among the individuals concerned. So the results provide support for the idea that older people benefit in employment terms from acquiring qualifications, but do not prove that all older people will similarly benefit from acquiring qualifications.

Figure 5: Impact of timing of qualifications on employment rates of older workers





Source: Derived from the ABS Survey of Education and Training Experience, 2001

As well as looking at the timing of qualifications, the Survey of Education and Training Experience provides a series of variables on an individual's engagement with education and training. These variables include:

- whether an individual has acquired a qualification subsequent to the acquisition of their highest qualification
- the number of non-school qualifications
- whether the person was currently enrolled in a course
- whether the person intends to enrol in the future
- time spent on incomplete educational awards over the previous five years.

The hypothesis consistent with the lifelong learning policy push is that these variables will be positively associated with engagement with the labour market. We test this hypothesis by adding these variables to the models developed above. The results (appendix I) are presented schematically below. A positive indicates that the sign is positive (as we would expect according to our hypothesis) at the 50% significance level. A negative indicates that the sign is negative at the 50% significance level. The remaining estimates are not significantly different from zero (at the 50% significance level). We choose this rather extravagant significance level to see if some pattern emerges over the eight groups.

Table 10: Impact of various education variables on employment rates

	Males				Females			
	Post-grad	Degree, adv dip	Cert III or IV	Cert I or II	Post-grad	Degree, adv dip	Cert III or IV	Cert I or II
One additional qual	+	+	..	+	+	+	+	..
Two + additional quals	na	+	..	-	na	+	..	+
Latest qual not highest	-	-	..	..	..	+	..	-
Intend to enrol in future	..	..	-	..	..	..	..	-
Currently enrolled	-	-	-	-	..	-	+	-
Incomplete award (1–5 years study)	..	..	-	..	..	+	-	-
Incomplete award (< I year study)	..	..	..	..	..	-	..	+

Source: Derived from the ABS Survey of Education and Training Experience, 2001

This exercise provides some support to the idea that the more qualifications the better. The signs on the additional qualification variables are all positive (and a couple of them are significant at the 5% level). However, the other variables are a mixed bag. Being currently enrolled or intending to enrol, if anything, is associated with a lower employment rate—perhaps for these people education is an alternative to employment. Having a more recent qualification different from the highest already held tends to suggest that, everything else being equal, obtaining a lower-level qualification later in life does not do a whole lot for employment prospects. So while the more qualifications the merrier, it would seem that engagement with the labour market is associated with obtaining higher-level qualifications rather than lower-level qualifications. Having incomplete qualifications is not associated with employment rates in any systematic way.

Our final fling in this area is to have a look at the extent to which training might provide some insurance against becoming not employed.[9] We take everyone who had a wage or salaried job in the last 12 months, the number of training courses they completed and whether they are currently employed or not. We would expect a positive association between current employment status and the training undertaken. Such a positive association would support the thrust of underpinning the concept of lifelong learning; that is, if you don't continue to keep your skills up to date there is more chance of becoming unemployed. However, such a finding would only be suggestive because one could argue that employees are given training precisely because the employer expects to keep them.

Nevertheless, the results (appendix J), presented in table 11, are supportive of the hypothesis. Again, a positive indicates that the sign is positive. Those in bold are jointly significant at the 5% level.

Table 11: Impact of the number of training courses completed on employment rates

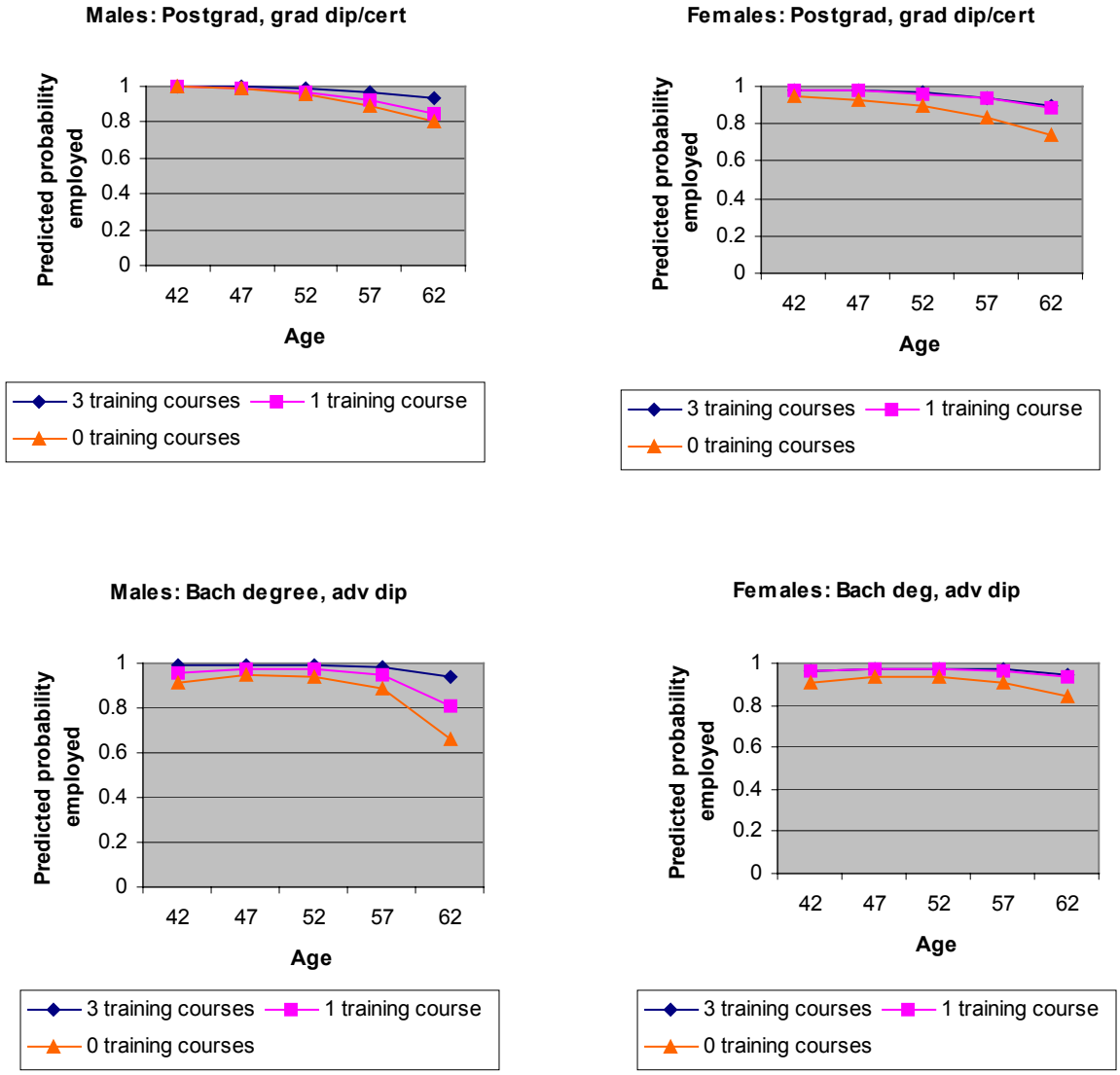
	Postgrad, grad dip/cert	Degree, adv dip	Cert III or IV	Cert I or II	Year 11 or 12	Year 10 or less
Males						
Completed training	+	**+**	**+**	**+**	+	**+**
Females						
Completed training	+	**+**	+	**+**	**+**	**+**

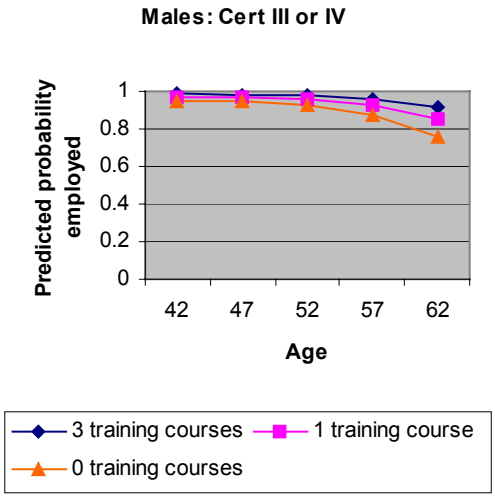
Source: Derived from the ABS Survey of Education and Training Experience, 2001

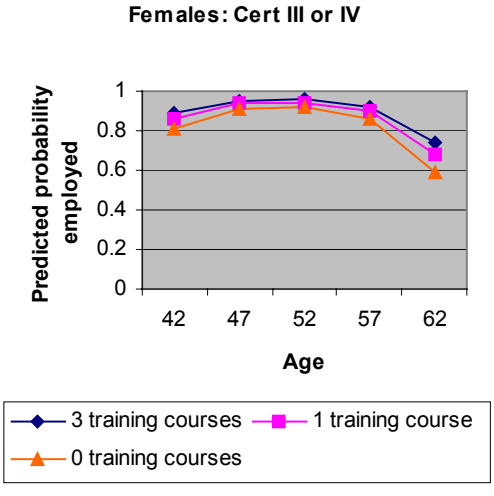
[9] We don't have employment status at the beginning and end of the year, so our analysis is somewhat limited here. Ideally, we should also look at whether training assists the unemployed in obtaining employment.

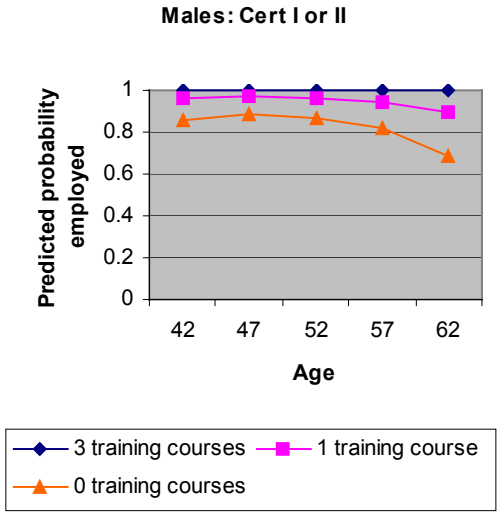
In each regression, the sign on the training variable is positive, although we acknowledge that the standard errors are generally quite high. To get some sort of idea of the magnitude, we calculate the probability that a wage or salary earner stays in employment with and without training in the last 12 months, and plot the probabilities in figure 6.

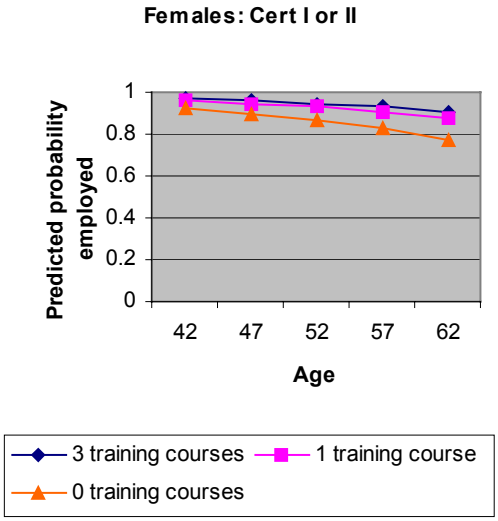
Figure 6: Impact of the number of training courses completed on probability of remaining in employment at the end of year



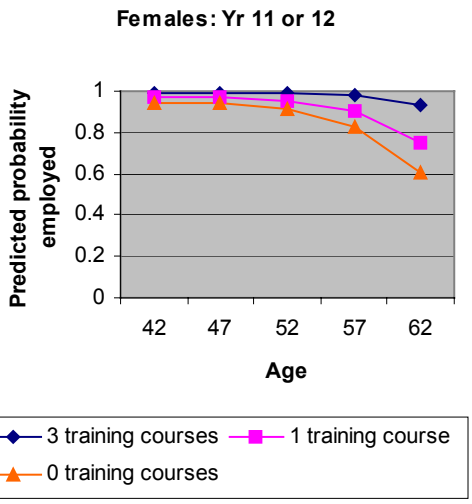

Males: Cert III or IV
Predicted probability employed
1
0.8
0.6
0.4
0.2
0
42
47
52
57
62
Age
3 training courses
1 training course
0 training courses


Females: Cert III or IV
Predicted probability employed
1
0.8
0.6
0.4
0.2
0
42
47
52
57
62
Age
3 training courses
1 training course
0 training courses

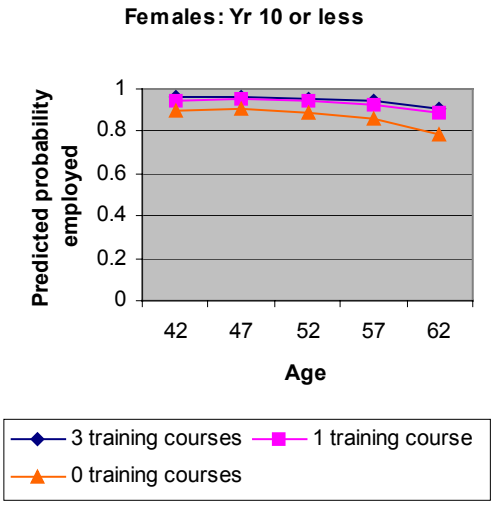

Males: Cert I or II
Predicted probability employed
1
0.8
0.6
0.4
0.2
0
42
47
52
57
62
Age
3 training courses
1 training course
0 training courses


Females: Cert I or II
Predicted probability employed
1
0.8
0.6
0.4
0.2
0
42
47
52
57
62
Age
3 training courses
1 training course
0 training courses


Males: Yr 11 or 12
Predicted probability employed
1
0.8
0.6
0.4
0.2
0
42
47
52
57
62
Age
3 training courses
1 training course
0 training courses


Females: Yr 11 or 12
Predicted probability employed
1
0.8
0.6
0.4
0.2
0
42
47
52
57
62
Age
3 training courses
1 training course
0 training courses


Males: Yr 10 or less
Predicted probability employed
1
0.8
0.6
0.4
0.2
0
42
47
52
57
62
Age
3 training courses
1 training course
0 training courses


Females: Yr 10 or less
Predicted probability employed
1
0.8
0.6
0.4
0.2
0
42
47
52
57
62
Age
3 training courses
1 training course
0 training courses

5 Conclusion

Essentially this report has been concerned with the relationship between education, and to a lesser extent, training, and employment of older workers. It has examined how engagement with the labour market and educational levels are related: to what extent changes in employment rates over the period 1993 to 2003 can be attributed to increasing levels of education categories; the impact of the current historically high level of education attainment on employment rates as more educated cohorts replace less educated cohorts; whether education undertaken later in life has the same impact on employment rates as education undertaken at the labour market entry stage; and, finally, whether training on the job assists in maintaining employment.

Our empirical results are quite supportive of a policy thrust common to Organisation for Economic Co-operation and Development (OECD) countries: high education levels, lifelong learning (at least in terms of the acquisition of formal qualifications), and training beneficial to maintaining employment rates. Of course, the magnitude of the effects varies. They tend to be larger for women than for men and are not such that more and more education and training will be a panacea for all the challenges our ageing populations face. Another important consideration is that the results tend to suggest that it is higher-level awards that have an impact, especially for women. Incomplete awards and having a recent, but lower-level award (relative to highest level award held by the individuals) do not necessarily make much difference to a group's employment rate. Nevertheless, it will be of some comfort to policy-makers that there is some evidence to underpin the rhetoric, although, of course, there is nothing in the analysis in this report to indicate how many resources should be put into entry-level education and training compared with 'lifelong' education and training, and who should pay.

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Appendices

Appendix A

Employment rates by age, sex and educational level, Survey of Education and Training Experience, 2001

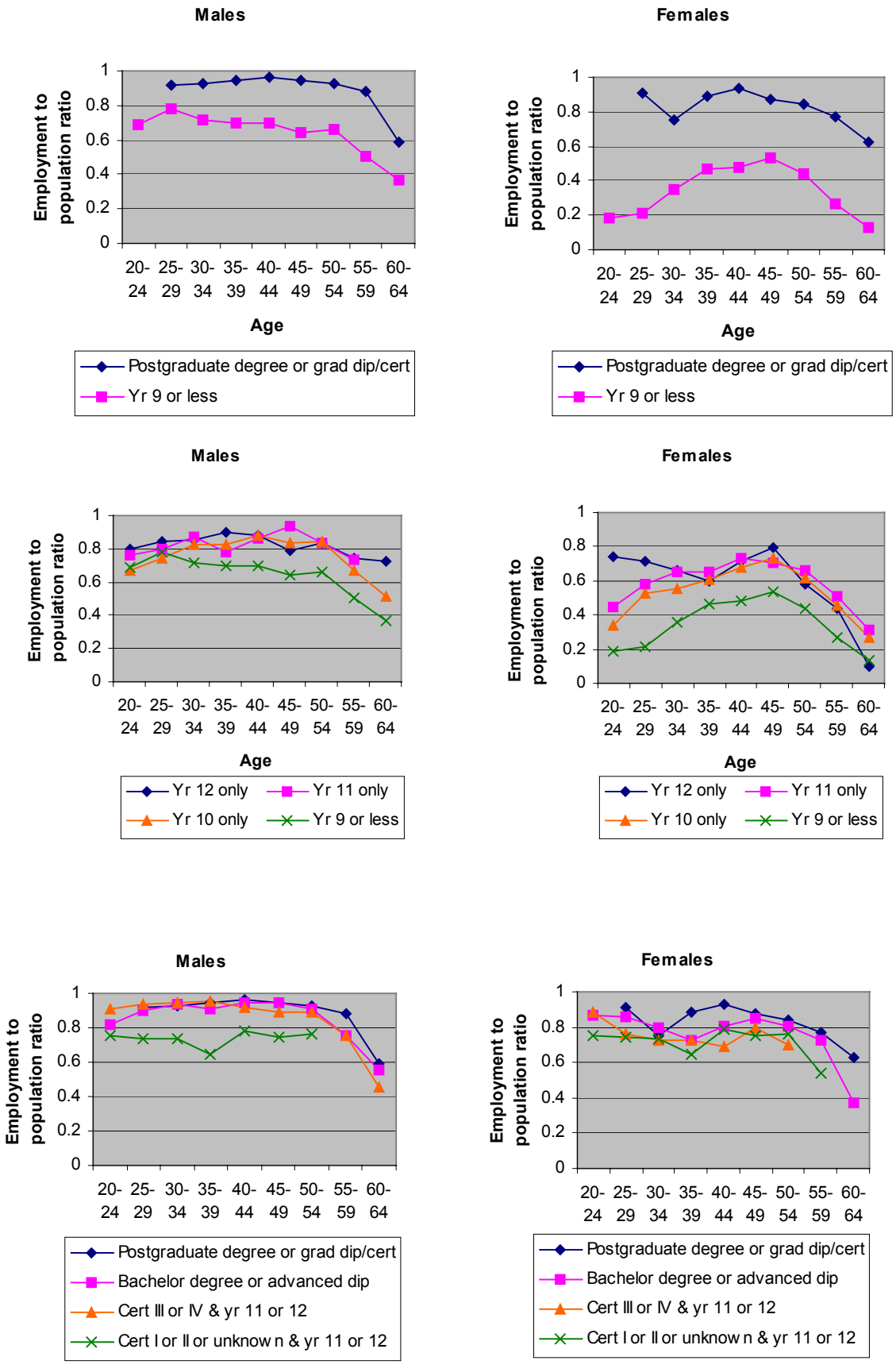
Table A1: Employment rates by age, sex and educational level, 2001

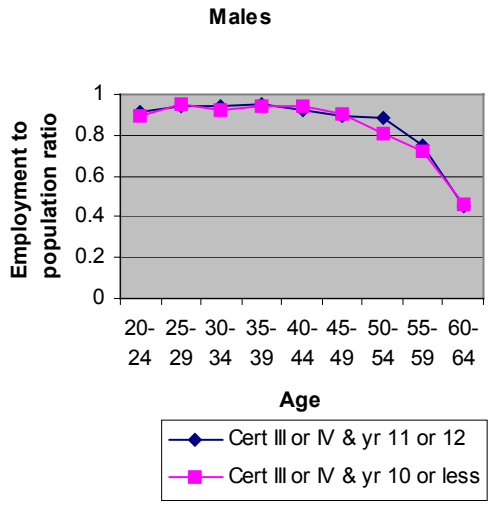
	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64
Males										
Postgraduate degree or graduate dip/certificate	0.31*	0.96*	0.92	0.93	0.94	0.96	0.94	0.92	0.88	0.59
Bachelor degree or advanced dip	0.49*	0.82	0.90	0.94	0.91	0.94	0.95	0.91	0.75	0.55
Certificate III or IV & Year 11 or 12	0.60*	0.91	0.94	0.94	0.95	0.92	0.89	0.89	0.75	0.46
Certificate III or IV & Year 10 or less	1.00*	0.90	0.95	0.93	0.94	0.94	0.91	0.80	0.72	0.46
Certificate I or II or unknown & Year 11 or 12	0.60	0.79	0.83	0.86	0.92	0.91	0.81	0.95	0.93*	0.53
Certificate I or II or unknown & Year 10 or less	0.67	0.73	0.74	0.88	0.82	0.76	0.84	0.82	0.66	0.50
Year 12 only	0.72	0.80	0.84	0.86	0.90	0.88	0.79	0.84	0.74	0.72
Year 11 only	0.49	0.76	0.80	0.87	0.78	0.86	0.94	0.83	0.73	0.49*
Year 10 only	0.47	0.67	0.74	0.83	0.83	0.88	0.84	0.85	0.67	0.52
Year 9 or less	0.30	0.69	0.78	0.72	0.70	0.69	0.64	0.66	0.50	0.37
Females										
Postgraduate degree or graduate dip/ certificate	0.55*	0.75*	0.91	0.75	0.89	0.93	0.87	0.84	0.77	0.62
Bachelor degree or advanced dip	1.00*	0.87	0.86	0.79	0.72	0.81	0.85	0.81	0.72	0.37
Certificate III or IV & Year 11 or 12	0.85	0.89	0.76	0.72	0.73	0.69	0.79	0.70	0.84*	0.18*
Certificate III or IV & Year 10 or less	0.38*	0.52	0.67	0.60	0.73	0.74	0.81	0.81	0.52	0.21
Certificate I or II or unknown & Year 11 or 12	0.71	0.75	0.74	0.73	0.64	0.78	0.75	0.77	0.54	0.28*
Certificate I or II or unknown & Year 10 or less	0.73	0.58	0.55	0.63	0.64	0.71	0.70	0.74	0.59	0.30
Year 12 only	0.73	0.75	0.72	0.66	0.60	0.71	0.80	0.58	0.44	0.10
Year 11 only	0.50	0.45	0.58	0.65	0.65	0.73	0.71	0.66	0.51	0.31
Year 10 only	0.46	0.34	0.52	0.56	0.61	0.68	0.73	0.62	0.46	0.27
Year 9 or less	0.32	0.19	0.21	0.35	0.47	0.48	0.53	0.44	0.27	0.13

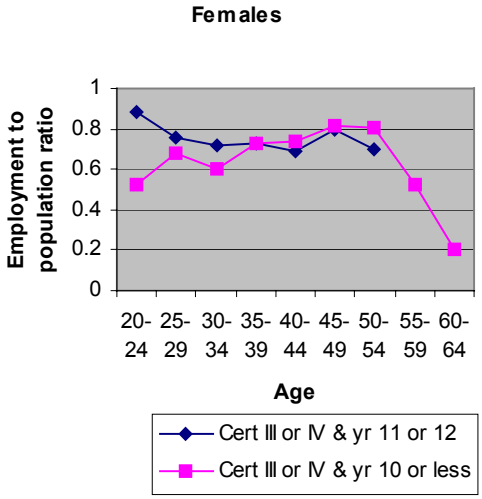
Note: * Fewer than 20 observations

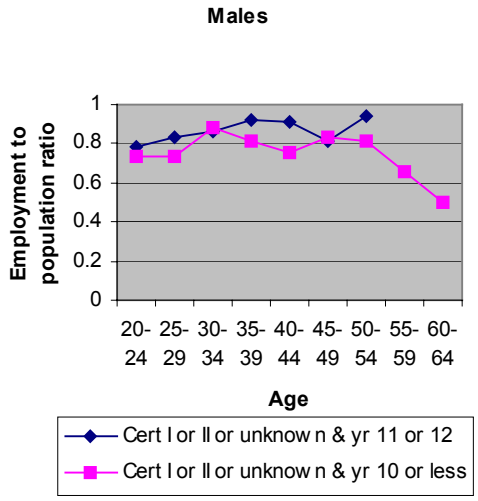
Source: Derived from the ABS Survey of Education and Training Experience, 2001

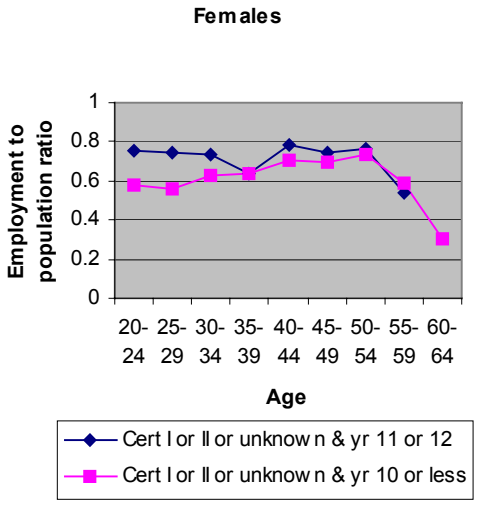
Figure A1: Employment-to-population rates by age and educational level, 2001

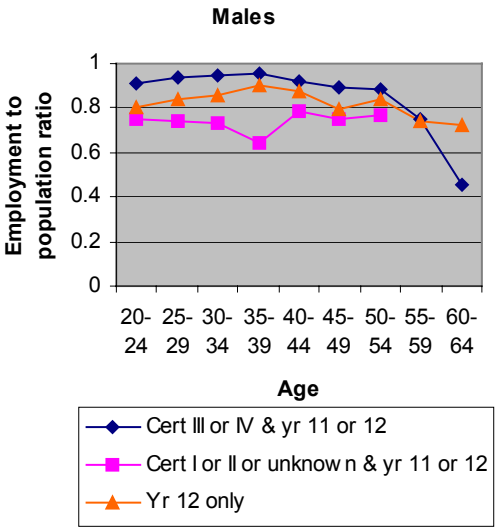


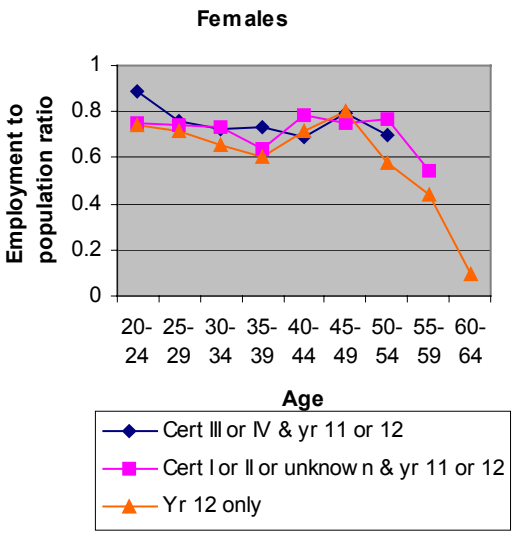












Note: Points based on fewer than 20 observations have been omitted.
Source: Derived from the ABS Survey of Education and Training Experience, 2001

Appendix B

Logistic models of impact of educational qualifications on employment rates

A logistic model was used with the dependent variable employment status (1 if employed, 0 otherwise).

Age was taken as mid points of the ranges 40–44, 45–49, 50–54, 55–59 and 60–64.

Table B1: Males aged 40–64 years, with postgraduate degree or graduate diploma or certificate

N= 513

Variable	Estimate	Standard error
Intercept	-13.2451	10.6492
Age	0.7367	0.4091
Age squared	0.00828	0.00387

Table B2: Males aged 40–64 years, with degree or advanced diploma

N= 1045

Variable	Estimate	Standard error
Intercept	-13.2151	6.4923
Age	0.7274	0.2517
Age squared	-0.00827	0.00241

Table B3: Males aged 40–64 years, with certificate III or IV and Year 11 or 12

N= 425

Variable	Estimate	Standard error
Intercept	-11.1502	9.4237
Age	0.6325	0.3707
Age squared	-0.00734	0.00359

Table B4: Males aged 40–64 years, with certificate III or IV and Year 10 or less

N= 1095

Variable	Estimate	Standard error
Intercept	0.5492	5.5877
Age	0.1816	0.2141
Age squared	-0.00310	0.00203

Table B5: Males aged 40–64 years, with certificate I or II and Year 11 or 12

N= 171

Variable	Estimate	Standard error
Intercept	-16.5638	13.6929
Age	0.7933	0.5400
Age squared	-0.00836	0.00523

Table B6: Males aged 40–64 years, with certificate I or II and Year 10 or less

N= 249

Variable	Estimate	Standard error
Intercept	-14.1404	9.5397
Age	0.6685	0.3683
Age squared	-0.00711	0.00350

Table B7: Males aged 40–64 years, with Year 12

N= 409

Variable	Estimate	Standard error
Intercept	2.6140	8.2781
Age	0.00551	0.3260
Age squared	-0.00057	0.00317

Table B8: Males aged 40–64 years, with Year 11

N= 197

Variable	Estimate	Standard error
Intercept	-23.5256	13.2658
Age	1.0854	0.5274
Age squared	-0.0114	0.00517

Table B9: Males aged 40–64 years, with Year 10

N= 651

Variable	Estimate	Standard error
Intercept	-6.3320	6.3854
Age	0.3855	0.2504
Age squared	-0.00454	0.00242

Table B10: Males aged 40–64 years, with Year 9 or less

N= 921

Variable	Estimate	Standard error
Intercept	-8.6860	4.5980
Age	0.4258	0.1773
Age squared	-0.00477	0.00169

Table B11: Females aged 40–64 years, with postgraduate degree or graduate diploma or certificate

N= 436

Variable	Estimate	Standard error
Intercept	3.7815	8.5762
Age	0.0180	0.3336
Age squared	-0.00119	0.00320

Table B12: Females aged 40–64 years, with degree or advanced diploma

N= 1111

Variable	Estimate	Standard error
Intercept	-20.2012	4.6790
Age	0.9296	0.1853
Age squared	-0.00988	0.00181

Table B13: Females aged 40–64 years, with certificate III or IV and Year 11 or 12

N= 154

Variable	Estimate	Standard error
Intercept	-33.6321	13.1896
Age	1.4384	0.5347
Age squared	-0.0147	0.00533

Table B14: Females aged 40–64 years, with certificate III or IV and Year 10 or less

N= 278

Variable	Estimate	Standard error
Intercept	-31.4548	9.4008
Age	1.3730	0.3733
Age squared	-0.0143	0.00366

Table B15: Females aged 40–64 years, with certificate I or II and Year 11 or 12

N= 266

Variable	Estimate	Standard error
Intercept	-14.4925	9.4539
Age	0.6892	0.3791
Age squared	-0.00754	0.00374

Table B16: Females aged 40–64 years, with certificate I or II and Year 10 or less

N= 531

Variable	Estimate	Standard error
Intercept	-17.5769	6.1302
Age	0.7973	0.2421
Age squared	-0.00852	0.00236

Table B17: Females aged 40–64 years, with Year 12

N= 398

Variable	Estimate	Standard error
Intercept	-23.4217	8.0271
Age	1.0629	0.3249
Age squared	-0.0115	0.00324

Table B18: Females aged 40–64 years, with Year 11

N= 315

Variable	Estimate	Standard error
Intercept	-7.4500	7.9692
Age	0.4057	0.3173
Age squared	-0.00481	0.00312

Table B19: Females aged 40–64 years, with Year 10

N= 1214

Variable	Estimate	Standard error
Intercept	-9.5469	4.0591
Age	0.4873	0.1600
Age squared	-0.00566	0.00156

Table B20: Females aged 40–64 years, with Year 9 or less

N= 1128

Variable	Estimate	Standard error
Intercept	-16.3062	4.4366
Age	0.7198	0.1732
Age squared	-0.00789	0.00167

Source: Derived from the Survey of Education and Training Experience, 2001

Appendix C

Average hours per week for employed people by age, sex and educational level, Survey of Education and Training Experience, 2001

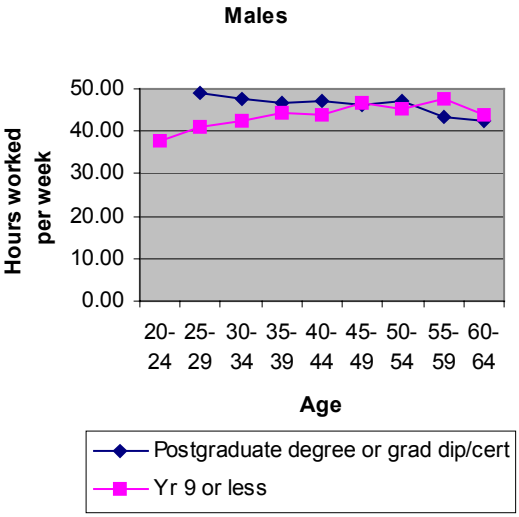
Table C1: Average hours per week for employed people by age, sex and educational level, 2001

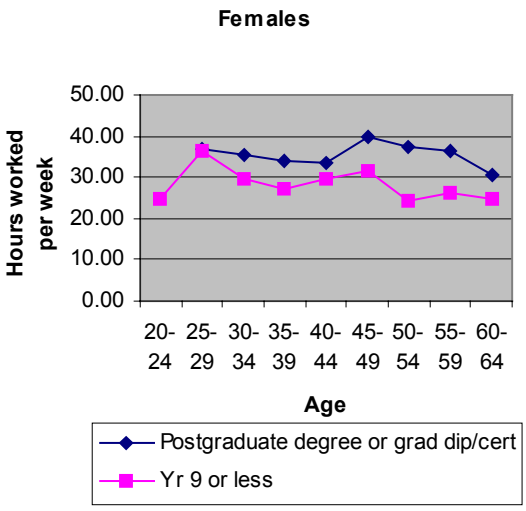
	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64
Males										
Postgraduate degree or graduate dip/ certificate	45.00*	37.14*	49.09	47.44	46.66	47.15	46.00	46.94	43.56	42.59
Bachelor degree or advanced dip	26.56*	35.94	42.08	45.22	46.06	45.81	46.80	44.19	44.60	37.45
Certificate III or IV & Year 11 or 12	18.16*	41.99	44.38	44.96	46.94	44.26	45.69	47.06	43.36	45.45
Certificate III or IV & Year 10 or less	43.42*	41.05	44.29	45.07	47.91	47.90	44.07	44.85	41.05	36.72
Certificate I or II or unknown & Year 11 or 12	27.27	38.10	39.16	45.74	45.08	46.08	46.47	46.01	39.54*	38.26*
Certificate I or II or unknown & Year 10 or less	38.15	37.83	45.23	44.99	42.72	45.90	47.75	47.63	44.08	35.11
Year 12 only	24.17	31.13	40.46	45.54	43.98	41.65	43.51	48.08	42.76	37.09
Year 11 only	21.17	37.31	43.48	42.98	45.35	48.91	46.91	44.64	40.27	28.05*
Year 10 only	24.37	39.07	40.93	45.72	42.40	46.72	45.49	42.35	44.29	39.93
Year 9 or less	18.68	37.72	40.89	42.46	44.37	43.84	46.87	45.47	47.68	43.96
Females										
Postgraduate degree or graduate dip/ certificate	7.94*	33.94*	36.96	35.50	34.20	33.44	39.74	37.57	36.46	30.41
Bachelor degree or advanced dip	27.22*	35.00	36.16	33.80	29.82	30.72	32.54	34.45	31.95	27.75
Certificate III or IV & Year 11 or 12	30.90	35.26	35.47	28.79	28.10	31.08	33.49	37.34	30.15*	3.00*
Certificate III or IV & Year 10 or less	39.12*	28.67	34.01	30.24	25.72	30.31	25.08	28.97	29.97	27.64
Certificate I or II or unknown & Year 11 or 12	24.26	33.24	32.80	28.92	25.37	29.35	32.53	33.10	27.37	30.90*
Certificate I or II or unknown & Year 10 or less	32.71	30.71	23.19	25.66	29.09	30.16	30.70	31.80	29.28	20.22
Year 12 only	19.12	24.71	33.86	30.03	30.62	28.74	35.81	31.49	33.49	25.09
Year 11 only	13.49	35.87	29.27	25.73	24.74	29.60	33.26	28.49	32.29	19.62
Year 10 only	13.72	29.05	29.71	30.89	27.60	28.86	30.33	32.28	29.15	24.82
Year 9 or less	11.10	24.60	36.43	29.71	27.05	29.66	31.47	24.50	26.29	24.75

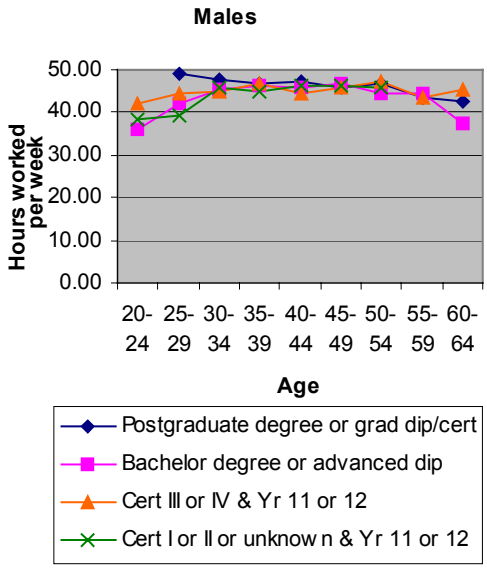
Note: * Fewer than 20 observations

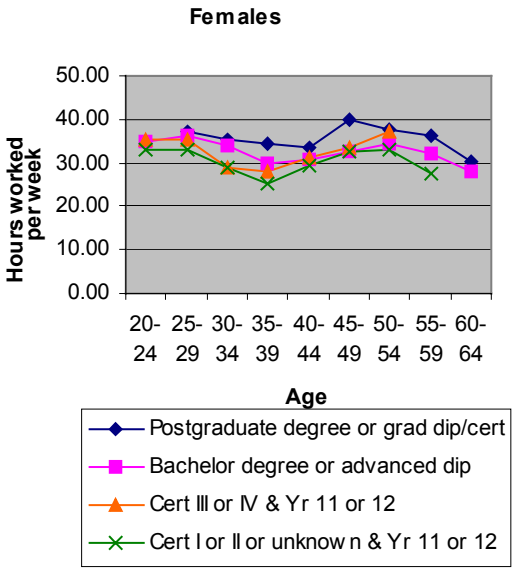
Source: Derived from the ABS Survey of Education and Training Experience, 2001

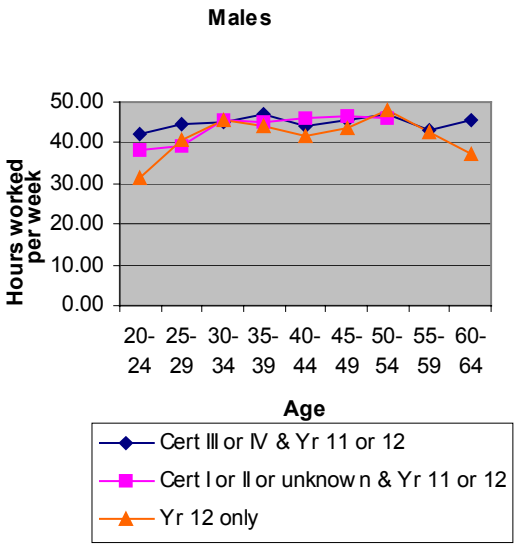
Figure C1: Average hours worked per week for employed people by age, sex and educational level, 2001

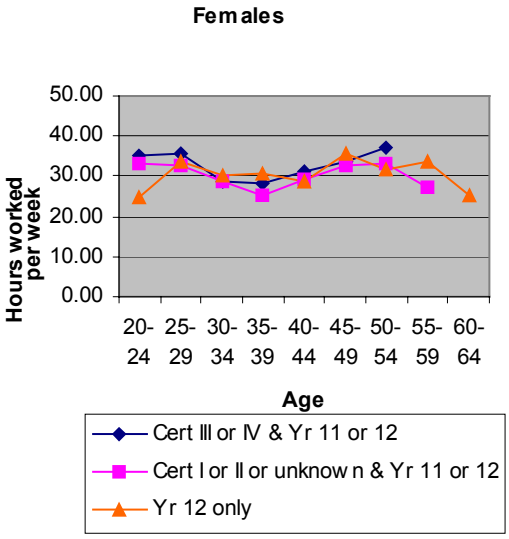


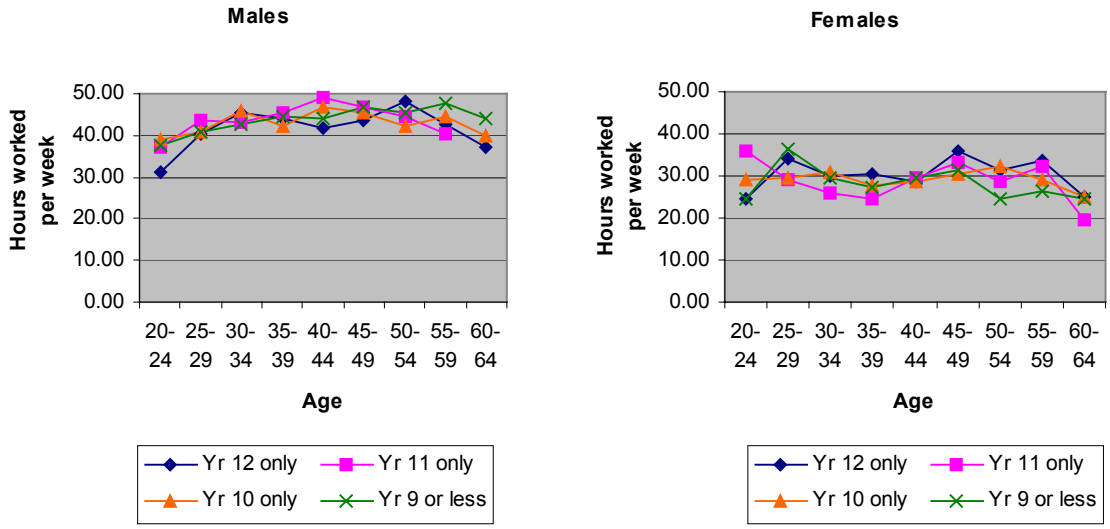












Note: Points based on fewer than 20 observations have been omitted.
Source: Derived from the ABS Survey of Education and Training Experience, 2001

Appendix D

Linear regression estimating the impact of educational qualifications on hours worked per week

A linear regression was run for those who worked, with the dependent variable hours usually worked per week in current job or business.

Hours worked per week were taken as the midpoints of the following ranges 50–54, 55–59, 60–64 and 65–69. The category one hour and under was assigned a value of 1 and the category 70 hours and over was assigned a value of 80. Otherwise, the remaining values representing hours worked per week, 2 to 49, were left in their original continuous form.

Age was taken as midpoints of the ranges 40–44, 45–49, 50–54, 55–59 and 60–64.

Table D1: Males aged 40–64 years, with postgraduate degree or graduate diploma or certificate

N= 465

Variable	Estimate	Standard error
Intercept	16.35035	46.42521
Age	1.39667	1.84682
Age squared	-0.01575	0.01816

Table D2: Males aged 40–64 years, with degree or advanced diploma

N= 913

Variable	Estimate	Standard error
Intercept	-14.72264	32.35881
Age	2.62879	1.29876
Age squared	-0.02849	0.01289

Table D3: Males aged 40–64 years, with certificate III or IV and Year 11 or 12

N= 365

Variable	Estimate	Standard error
Intercept	-20.58012	49.97804
Age	2.65728	2.03291
Age squared	-0.02648	0.02044

Table D4: Males aged 40–64 years, with certificate III or IV and Year 10 or less

N= 868

Variable	Estimate	Standard error
Intercept	46.12691	32.99807
Age	0.37671	1.31574
Age squared	-0.00819	0.01293

Table D5: Males aged 40–64 years, with certificate I or II and Year 11 or 12

N= 147

Variable	Estimate	Standard error
Intercept	-53.04908	84.44341
Age	4.28970	3.41266
Age squared	-0.04606	0.03406

Table D6: Males aged 40–64 years, with certificate I or II and Year 10 or less

N= 176

Variable	Estimate	Standard error
Intercept	-111.95865	76.99403
Age	6.57887	3.00394
Age squared	-0.06777	0.02888

Table D7: Males aged 40–64 years, with Year 12

N= 331

Variable	Estimate	Standard error
Intercept	-93.07932	53.41749
Age	5.58260	2.13718
Age squared	-0.05612	0.02110

Table D8: Males aged 40–64 years, with Year 11

N= 166

Variable	Estimate	Standard error
Intercept	-60.69949	88.55482
Age	4.95907	3.58819
Age squared	-0.05649	0.03599

Table D9: Males aged 40–64 years, with Year 10

N= 511

Variable	Estimate	Standard error
Intercept	48.51763	44.08324
Age	0.15196	1.76247
Age squared	-0.00472	0.01737

Table D10: Males aged 40–64 years, with Year 9 or less

N= 515

Variable	Estimate	Standard error
Intercept	-31.44143	49.29154
Age	3.00229	1.92456
Age squared	-0.02882	0.01857

Table D11: Females aged 40–64 years, with postgraduate degree or graduate diploma or certificate

N= 363

Variable	Estimate	Standard error
Intercept	-128.61010	56.23739
Age	6.63132	2.25908
Age squared	-0.06573	0.02241

Table D12: Females aged 40–64 years, with degree or advanced diploma

N= 339

Variable	Estimate	Standard error
Intercept	-98.41443	35.54397
Age	5.21784	1.43431
Age squared	-0.05140	0.01430

Table D13: Females aged 40–64 years, with certificate III or IV and Year 11 or 12

N= 109

Variable	Estimate	Standard error
Intercept	-212.25473	140.72579
Age	10.10032	5.79697
Age squared	-0.10282	0.05903

Table D14: Females aged 40–64 years, with certificate III or IV and Year 10 or less

N= 187

Variable	Estimate	Standard error
Intercept	70.19542	85.75325
Age	-1.74488	3.45235
Age squared	0.01801	0.03443

Table D15: Females aged 40–64 years, with certificate I or II and Year 11 or 12

N= 187

Variable	Estimate	Standard error
Intercept	-77.19900	84.26458
Age	4.35484	3.43838
Age squared	-0.04339	0.03466

Table D16: Females aged 40–64 years, with certificate I or II and Year 10 or less

N= 339

Variable	Estimate	Standard error
Intercept	-118.40803	59.26235
Age	6.22930	2.37703
Age squared	-0.06416	0.02358

Table D17: Females aged 40–64 years, with Year 12

N= 252

Variable	Estimate	Standard error
Intercept	-122.15161	74.94649
Age	6.22258	3.07833
Age squared	-0.06206	0.03126

Table D18: Females aged 40–64 years, with Year 11

N= 209

Variable	Estimate	Standard error
Intercept	-74.87839	60.39814
Age	4.47261	2.44814
Age squared	-0.04706	0.02452

Table D19: Females aged 40–64 years, with Year 10

N= 718

Variable	Estimate	Standard error
Intercept	-63.08871	37.53827
Age	3.75712	1.50303
Age squared	-0.03745	0.01488

Table D20: Females aged 40–64 years, with Year 9 or less

N= 387

Variable	Estimate	Standard error
Intercept	61.92283	55.03866
Age	-0.97655	2.16814
Age squared	0.00571	0.02113

Source: Derived from the ABS Survey of Education and Training Experience, 2001

Appendix E

Mapping of educational categories, 1993–2003

To examine the effect of changing levels of education on changes in the employment rates historically, we used data from the May 2003 Education and Work Survey and the May 1993 Transition from Education to Work.

As the ABS education classification system changed in 2001 from the Australian Bureau of Statistics Classification of Qualifications (ABSCQ) to the Australian Standard Classification of Education (ASCED), we were required to convert 2003 data to ABSCQ classification. The resulting conversions are shown in the following table.

Table E1: Conversion of ASCED level of education to ABSCQ level of education

ASCED	ABSCQ
Postgraduate degree	Higher degree
Graduate diploma	Postgraduate diploma
Bachelor degree	Bachelor degree
Advanced diploma	Undergraduate diploma
Diploma or certificate IV	Associate diploma
Certificate III	Skilled vocational
Certificate one, two , certificate not further defined or level not determined	Basic vocational

Appendix F

Employed people and total population by age, sex and educational level, Survey of Education and Work and Transition from Education to Work

Table F1: Employed people by age, sex and educational level, Transition from Education to Work, 1993 ('000)

	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64
Males										
No Year 12	164.3	163.3	167.7	171.5	154.9	166.5	160.3	130.8	95.5	70.0
Year 12	85.0	147.7	95.4	93.4	85.1	68.9	53.1	39.9	23.8	14.8
Basic	7.8	19.1	13.4	15.6	13.9	13.7	12.9	9.4	6.3	3.5
Skilled	5.2	125.7	155.4	175.6	155.1	136.7	143.2	94.5	69.9	40.2
Associate diploma	2.3	27.9	39.4	52.2	52.8	56.0	47.2	39.2	19.1	5.8
Undergraduate diploma/bachelor degree	0.0	45.4	70.2	82.7	81.1	83.8	58.6	39.9	17.0	11.2
Higher degree/postgraduate diploma	0.0	2.7	13.5	24.0	38.9	37.1	31.6	17.9	8.2	6.2
Females										
No Year 12	134.9	113.7	117.3	136.1	152.7	182.6	173.0	109.2	60.1	25.3
Year 12	91.7	153.5	85.2	71.5	61.9	58.1	54.0	29.0	23.3	7.4
Basic	22.5	75.6	63.0	54.2	53.2	50.3	47.8	21.3	10.7	4.9
Skilled	1.2	26.6	28.9	24.4	22.0	24.0	18.8	13.5	7.0	3.2
Associate diploma	4.4	19.9	24.2	24.0	19.9	22.8	17.6	13.2	7.9	1.0
Undergraduate diploma/bachelor degree	0.0	70.3	83.0	87.9	95.1	78.3	58.1	40.9	16.5	8.4
Higher degree/postgraduate diploma	0.0	7.5	16.8	14.8	32.5	25.4	20.4	6.9	4.7	2.1

Source: Derived from the ABS Transition from Education to Work, 1993

Table F2: Total population by age, sex and educational level, Transition from Education to Work, 1993 ('000)

	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64
Males										
No Year 12	478.0	234.4	229.3	225.1	201.1	208.6	205.6	174.3	161.5	170.4
Year 12	159.2	232.9	116.0	110.8	98.6	81.2	63.4	49.2	39.9	36.0
Basic	9.7	23.5	18.7	17.6	16.0	15.9	14.5	10.2	8.1	6.6
Skilled	6.8	148.0	179.1	196.5	177.0	155.1	165.6	110.9	105.4	87.4
Associate diploma	2.7	33.6	43.7	56.7	58.0	61.3	53.8	43.7	27.8	23.8
Undergraduate diploma/bachelor degree	0.0	54.1	76.2	90.8	89.4	89.9	65.5	42.7	23.4	21.0
Higher degree/postgraduate diploma	0.0	2.7	15.1	27.7	40.6	39.2	32.9	20.5	9.8	8.4
Females										
No Year 12	419.6	224.8	250.3	294.0	279.6	307.2	291.7	229.8	220.2	230.6
Year 12	174.0	239.2	132.0	126.1	101.1	88.4	88.8	57.0	57.1	53.8
Basic	28.5	98.6	99.2	93.8	77.8	69.7	63.1	32.2	23.0	20.4
Skilled	2.4	32.8	39.4	38.5	33.7	31.4	27.4	19.2	16.7	19.6
Associate diploma	5.0	24.2	34.5	34.3	30.4	28.6	22.7	16.0	12.0	5.1
Undergraduate diploma/bachelor degree	0.7	86.3	100.3	121.2	127.4	94.6	74.9	52.3	31.4	22.0
Higher degree/postgraduate diploma	0.0	8.7	19.7	21.1	36.8	29.9	22.9	8.7	6.7	3.9

Source: Derived from the ABS Transition from Education to Work, 1993

Table F3: Employed people by age, sex and educational level, Transition from Education to work, 1998 ('000)

	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64
Males										
No year 12	186.7	105.0	140.0	160.4	184.8	153.4	161.8	156.2	114.6	58.7
Year 12	95.6	198.5	123.6	87.5	80.7	78.4	70.8	57.3	30.6	19.9
Basic	10.0	46.7	40.9	35.4	38.5	40.1	32.0	29.4	17.4	5.1
Skilled	3.6	84.4	157.9	147.6	153.0	146.4	122.7	94.3	75.9	41.5
Associate diploma	0.3	18.5	26.5	23.5	24.3	23.6	21.4	13.7	7.8	4.9
Undergraduate diploma/bachelor degree	1.7	64.2	117.8	114.5	118.6	114.9	103.8	82.0	45.7	15.4
Higher degree/postgraduate diploma	0.0	3.0	17.3	24.5	34.6	39.7	41.0	31.0	14.6	10.3
Females										
No Year 12	159.2	58.7	101.1	121.4	156.0	178.4	187.3	149.0	83.8	30.7
Year 12	108.4	173.7	100.5	80.4	65.3	58.5	53.3	49.6	24.9	9.8
Basic	16.3	61.4	66.6	61.5	63.3	65.5	56.5	43.4	18.0	6.2
Skilled	3.0	18.7	26.1	18.2	15.1	15.8	14.7	7.6	3.1	0.8
Associate diploma	2.9	28.6	28.2	16.0	17.8	15.4	15.1	10.6	5.0	1.5
Undergraduate diploma/bachelor degree	3.9	107.1	152.1	108.8	113.6	110.5	88.5	71.9	37.4	14.9
Higher degree/postgraduate diploma	0.0	10.1	26.4	24.7	32.0	35.0	32.8	20.2	10.1	5.3

Source: Derived from the ABS Transition from Education to Work, 1998

Table F4: Total population by age, sex and educational level, Transition from Education to Work, 1998 ('000)

	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64
Males										
No Year 12	489.4	150.4	183.9	207.1	231.0	196.9	211.5	215.1	188.2	157.3
Year 12	148.9	281.5	153.6	99.7	92.2	89.1	85.8	72.9	44.4	43.9
Basic	19.0	54.5	47.9	43.5	46.2	42.8	36.4	34.3	23.0	14.6
Skilled	4.8	93.1	169.5	159.2	170.7	160.5	134.1	114.5	101.1	85.7
Associate diploma	0.3	20.4	27.1	24.3	25.7	25.1	25.2	16.2	10.7	9.3
Undergraduate diploma/bachelor degree	2.0	75.4	129.0	122.2	125.7	121.6	111.1	89.8	57.4	30.8
Higher degree/postgraduate diploma	0.0	3.4	18.2	26.0	35.5	43.1	43.2	33.0	17.2	13.9
Females										
No year 12	425.7	126.0	210.8	254.3	288.8	298.1	304.4	281.9	245.6	224.6
Year 12	171.8	262.3	148.5	116.2	115.8	87.8	77.5	75.6	59.9	49.3
Basic	21.0	86.7	91.1	93.8	102.2	84.9	76.6	70.7	40.1	22.9
Skilled	5.2	24.9	33.8	29.1	22.8	23.0	22.1	11.1	7.6	7.6
Associate diploma	3.7	33.7	36.5	22.9	23.6	19.1	19.0	13.6	9.2	4.0
Undergraduate diploma/bachelor degree	4.9	119.0	179.2	150.4	149.8	137.0	111.7	85.8	56.7	35.5
Higher degree/postgraduate diploma	0.0	11.5	30.7	33.0	39.5	41.7	37.6	23.4	13.3	11.3

Source: Derived from the ABS Transition from Education to Work, 1998

Table F5: Employed people by age, sex and educational level, Survey of Education and Work Experience, 2003 ('000)

	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64
Males										
No Year 12	186.7	104.4	92.9	131.4	142.1	157.5	154.6	141.7	129.1	71.6
Year 12	114.3	192.8	127.7	98.3	77.0	62.1	62.3	52.1	30.0	15.5
Basic	18.5	47.2	43.6	38.2	35.4	39.4	36.4	26.1	25.0	14.2
Skilled	8.6	98.0	127.3	173.7	177.4	172.3	157.7	121.7	95.9	55.7
Associate diploma	3.9	30.3	43.8	41.0	36.3	31.4	30.8	29.5	16.7	5.2
Undergraduate diploma/bachelor degree	0.0	69.0	138.6	130.9	105.9	122.6	120.3	112.2	77.7	33.7
Higher degree/postgraduate diploma	0.0	4.6	21.0	36.5	48.4	50.2	41.3	48.4	28.4	13.2
Females										
No year 12	172.7	48.4	43.1	88.4	132.5	160.8	173.7	165.0	114.5	51.1
Year 12	133.1	190.7	105.0	90.7	73.3	56.3	55.9	40.2	24.4	9.5
Basic	22.4	53.6	52.2	44.7	59.5	67.8	62.0	50.2	36.4	14.2
Skilled	9.8	49.8	34.4	33.4	25.6	38.6	23.4	20.7	17.7	3.9
Associate diploma	4.2	38.6	52.2	39.8	37.6	38.7	26.8	20.8	13.7	5.3
Undergraduate diploma/bachelor degree	0.8	100.7	164.7	146.1	117.2	128.5	128.5	85.5	51.8	26.8
Higher degree/postgraduate diploma	0.0	6.4	28.3	40.7	36.0	44.9	48.8	39.6	21.7	7.2

Source: Derived from the ABS Survey of Education and Work, 2003

Table F6: Total population by age, sex and educational level, Survey of Education and Work, 2003 ('000)

	15–19	20–24	25–29	30–34	35–39	40–44	45–49	50–54	55–59	60–64
Males										
No Year 12	476.7	143.5	123.4	169.6	178.7	201.9	194.0	192.5	197.8	162.3
Year 12	175.3	263.6	148.2	109.5	88.2	76.8	69.9	60.6	43.8	28.4
Basic	26.8	58.9	53.0	45.1	39.2	44.9	40.6	29.3	37.6	24.0
Skilled	11.2	104.9	142.1	182.9	188.7	189.9	172.9	139.4	125.1	93.5
Associate diploma	5.9	43.8	50.4	45.2	38.0	34.3	32.1	32.5	21.2	9.7
Undergraduate diploma/bachelor degree	0.4	89.1	155.3	143.3	115.4	132.6	127.7	121.6	94.7	60.4
Higher degree/postgraduate diploma	0.0	6.5	23.2	39.0	51.7	54.6	44.8	54.1	34.1	19.9
Females										
No Year 12	422.7	108.0	106.8	182.9	235.5	260.2	255.8	288.7	284.1	239.0
Year 12	194.5	273.6	156.8	142.8	106.9	83.2	77.2	58.8	48.5	29.8
Basic	28.8	73.0	81.4	83.0	86.6	90.7	83.9	69.5	60.9	38.7
Skilled	12.3	60.7	50.4	47.6	39.1	49.5	33.3	30.8	27.3	11.5
Associate diploma	6.5	52.5	70.5	52.9	50.1	47.8	32.5	24.9	21.3	9.7
Undergraduate diploma/bachelor degree	1.6	122.3	197.3	188.6	149.7	162.1	150.5	109.7	76.2	59.9
Higher degree/postgraduate diploma	0.0	8.0	34.6	51.2	46.2	54.0	54.9	46.5	27.5	12.5

Source: Derived from the ABS Survey of Education and Work, 2003

Appendix G
Projecting educational qualification levels

To project education levels in the future, we used data from the May 2003 Education and Work Survey, the May 1998 Transition from Education to Work and the May 1993 Transition from Education to Work. Data were purchased from the ABS.

The following levels of qualification, based on ABSCQ classification, were used in the models:

- ✧ higher degree or postgraduate diploma
- ✧ undergraduate degree or bachelor degree
- ✧ associate diploma
- ✧ skilled vocational
- ✧ basic vocational
- ✧ Year 12 only
- ✧ did not complete Year 12.

We ran three separate projections, whereby we based the acquisition of educational levels of each five-year age group in the future on the patterns that occurred between:

- ✧ 1993 and 2003
- ✧ 1993 and 1998
- ✧ 1998 and 2003.

More formally, we used data on education levels by age and estimated transitions using synthetic cohorts five years apart. For example, we observed the distributions of qualifications for, say, 20 to 24-year-olds at time *t* and compared them with the distribution for 25 to 29-year-olds at time *t + 5*. This comparison provided a transition matrix which we used to project education levels into the future. The transition matrix was derived in the following way.

First, we defined a vector of the proportions of individuals in an educational category of an age cohort at time 1 as $\underline{x}$. We then defined $\underline{y}$ as the vector of the same cohort at time 2. Finally, we defined A as the transition matrix, where a_{ij} is the proportion in category *i* which progresses to category *j* between time 1 and 2.

So $A'\underline{x} = \underline{y}$ (1)

However, we encountered a problem with this. If there are *Q* qualification levels, then there are Q^2 unknowns but only Q equations from (1). We overcame this difficulty by:

- ✧ noting that the rows of A must sum to one
- ✧ noting that the lower triangle of A is zero, as we order qualifications and individuals can only increase their level of highest educational attainment
- ✧ arbitrarily deciding on the proportion of the group which progresses from a qualification level to a higher level that go to each higher qualification level.

We set the following parameters

$$a_{ii} = \beta_i \qquad (2)$$

$$a_{ij} = 0 \quad \text{if } i > j \qquad (3)$$

$$a_{ij} = \alpha_{ij}(1 - \beta_i) \quad \text{if } i < j \qquad (4)$$

(2) Refers to the proportion of the cohort that remains at qualification level *i*.

(3) Refers to the statement that individuals can only increase their highest level of educational attainment.

(4) Refers to the proportion of the cohort that progress from level *i* to *j*.

With these restrictions, it was a simple matter to solve each β_i recursively and thus attain the values for a_{ij} by setting plausible values for each α.

The linear equations were solved as follows:

Did not complete Year 12 at time 2

$$\beta_1 x_1 = y_1$$

So $\beta_1 = y_1 / x_1$

Completed Year 12 at time 2

$$\alpha_{1,2}(1 - \beta_1)x_1 + \beta_2 x_2 = y_2$$

So $\beta_2 = \{y_2 - \alpha_{1,2}(1 - \beta_1)x_1\} / x_2$

In general, completed level *j* at time 2

$$\beta_j = \left\{ y_j - \sum_{i}^{j-1} \alpha_{i,j}(1 - \beta_i)x_i \right\} \Big/ x_j$$

To solve these equations, we specified each α. In doing, we made the following assumptions:

- ✧ Individuals, who did not complete Year 12 at time 1, would not progress to a higher degree or postgraduate certificate.
- ✧ Individuals who did not complete Year 12 at time 1 would not progress to completing Year 12, as it was thought that most of these individuals would progress to post-school qualifications.
- ✧ Individuals at the level of Year 12, basic vocational or skilled vocational at time 1 would not progress to a higher degree or postgraduate certificate when deriving transitions from data only five years apart. This was assumed, as typically individuals need to complete at least an associate diploma to be able to undertake a higher degree or postgraduate diploma. Consequently, it would be difficult to complete two qualifications in the five-year time frame.

The transition probabilities, based on 1993–2003 transitions, are provided below.

Table G1: Transition probabilities for males aged 20–24 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	0.72	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.47	0.00	0.00	0.00	0.00	0.00
Basic	0.07	0.08	0.41	0.00	0.00	0.00	0.00
Skilled	0.14	0.24	0.38	0.57	0.00	0.00	0.00
Associate diploma	0.01	0.03	0.03	0.15	0.36	0.00	0.00
Undergraduate diploma /degree	0.06	0.19	0.18	0.28	0.51	0.41	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.00	0.00	0.13	0.59	1.00

Table G2: Transition probabilities for males aged 25–29 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	0.76	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.74	0.00	0.00	0.00	0.00	0.00
Basic	0.07	0.07	0.72	0.00	0.00	0.00	0.00
Skilled	0.12	0.11	0.18	0.78	0.00	0.00	0.00
Associate diploma	0.01	0.03	0.01	0.04	0.52	0.00	0.00
Undergraduate diploma /degree	0.04	0.07	0.07	0.17	0.38	0.63	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.01	0.01	0.10	0.37	1.00

Table G3: Transition probabilities for males aged 30–34 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	0.89	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.68	0.00	0.00	0.00	0.00	0.00
Basic	0.06	0.14	0.81	0.00	0.00	0.00	0.00
Skilled	0.04	0.13	0.12	0.83	0.00	0.00	0.00
Associate diploma	0.00	0.00	0.01	0.03	0.47	0.00	0.00
Undergraduate diploma /degree	0.01	0.05	0.05	0.13	0.42	0.80	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.01	0.01	0.11	0.20	1.00

Table G4: Transition probabilities for males aged 35–39 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	0.96	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.71	0.00	0.00	0.00	0.00	0.00
Basic	0.03	0.20	0.95	0.00	0.00	0.00	0.00
Skilled	0.01	0.04	0.04	0.94	0.00	0.00	0.00
Associate diploma	0.00	0.00	0.00	0.00	0.54	0.00	0.00
Undergraduate diploma /degree	0.00	0.04	0.01	0.06	0.41	0.99	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.00	0.00	0.05	0.01	1.00

Table G5: Transition probabilities for males aged 40–44 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	0.95	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.77	0.00	0.00	0.00	0.00	0.00
Basic	0.03	0.14	0.84	0.00	0.00	0.00	0.00
Skilled	0.01	0.06	0.11	0.87	0.00	0.00	0.00
Associate diploma	0.00	0.00	0.00	0.01	0.53	0.00	0.00
Undergraduate diploma /degree	0.00	0.03	0.05	0.12	0.42	0.86	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.00	0.01	0.05	0.14	1.00

Table G6: Transition probabilities for males aged 45–49 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.75	0.00	0.00	0.00	0.00	0.00
Basic	0.00	0.24	1.00	0.00	0.00	0.00	0.00
Skilled	0.00	0.00	0.00	0.82	0.00	0.00	0.00
Associate diploma	0.00	0.00	0.00	0.04	0.32	0.00	0.00
Undergraduate diploma /degree	0.00	0.01	0.00	0.14	0.65	0.66	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.00	0.00	0.03	0.34	1.00

Table G7: Transition probabilities for males aged 50–54 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.64	0.00	0.00	0.00	0.00	0.00
Basic	0.00	0.34	0.99	0.00	0.00	0.00	0.00
Skilled	0.00	0.02	0.01	0.95	0.00	0.00	0.00
Associate diploma	0.00	0.00	0.00	0.00	0.25	0.00	0.00
Undergraduate diploma /degree	0.00	0.00	0.00	0.05	0.71	0.75	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.00	0.00	0.04	0.25	1.00

Table G8: Transition probabilities for females aged 20–24 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	0.78	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.57	0.00	0.00	0.00	0.00	0.00
Basic	0.08	0.09	0.42	0.00	0.00	0.00	0.00
Skilled	0.04	0.06	0.15	0.17	0.00	0.00	0.00
Associate diploma	0.03	0.04	0.12	0.21	0.59	0.00	0.00
Undergraduate diploma /degree	0.07	0.24	0.32	0.58	0.33	0.57	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.00	0.04	0.08	0.43	1.00

Table G9: Transition probabilities for females aged 25–29 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	0.90	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.75	0.00	0.00	0.00	0.00	0.00
Basic	0.05	0.05	0.64	0.00	0.00	0.00	0.00
Skilled	0.02	0.04	0.09	0.49	0.00	0.00	0.00
Associate diploma	0.02	0.04	0.09	0.10	0.71	0.00	0.00
Undergraduate diploma /degree	0.02	0.11	0.16	0.38	0.26	0.81	0.00
Higher degree/postgraduate diploma	0.00	0.01	0.02	0.03	0.03	0.19	1.00

Table G10: Transition probabilities for females aged 30–34 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	0.87	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.63	0.00	0.00	0.00	0.00	0.00
Basic	0.06	0.13	0.59	0.00	0.00	0.00	0.00
Skilled	0.04	0.07	0.10	0.46	0.00	0.00	0.00
	0.01	0.04	0.08	0.11	0.76	0.00	0.00
Associate diploma							
Undergraduate diploma /degree	0.02	0.13	0.21	0.40	0.19	0.78	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.02	0.03	0.05	0.22	1.00

Table G11: Transition probabilities for females aged 35–39 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	0.92	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.74	0.00	0.00	0.00	0.00	0.00
Basic	0.04	0.09	0.80	0.00	0.00	0.00	0.00
Skilled	0.01	0.04	0.04	0.68	0.00	0.00	0.00
Associate diploma	0.00	0.03	0.03	0.05	0.82	0.00	0.00
Undergraduate diploma /degree	0.02	0.10	0.13	0.27	0.15	0.87	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.00	0.00	0.04	0.13	1.00

Table G12: Transition probabilities for females aged 40–44 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No year 12	0.98	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.66	0.00	0.00	0.00	0.00	0.00
Basic	0.01	0.12	0.83	0.00	0.00	0.00	0.00
Skilled	0.00	0.05	0.03	0.76	0.00	0.00	0.00
Associate diploma	0.00	0.02	0.03	0.04	0.73	0.00	0.00
Undergraduate diploma /degree	0.00	0.15	0.11	0.19	0.21	0.83	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.00	0.01	0.05	0.17	1.00

Table G13: Transition probabilities for females aged 45–49 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.58	0.00	0.00	0.00	0.00	0.00
Basic	0.00	0.19	0.77	0.00	0.00	0.00	0.00
Skilled	0.00	0.11	0.05	0.63	0.00	0.00	0.00
Associate diploma	0.00	0.02	0.06	0.07	0.68	0.00	0.00
Undergraduate diploma /degree	0.00	0.11	0.11	0.28	0.28	0.69	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.01	0.02	0.03	0.31	1.00

Table G14: Transition probabilities for females aged 50–54 in 1993, based on 1993–2003 transitions

	Time 1						
	No Year 12	Year 12	Basic	Skilled	Associate diploma	Undergraduate diploma/ degree	Higher degree/ postgraduate diploma
Time 2							
No Year 12	1.00	0.00	0.00	0.00	0.00	0.00	0.00
Year 12	0.00	0.53	0.00	0.00	0.00	0.00	0.00
Basic	0.00	0.28	0.73	0.00	0.00	0.00	0.00
Skilled	0.00	0.02	0.07	0.43	0.00	0.00	0.00
Associate diploma	0.00	0.02	0.04	0.09	0.36	0.00	0.00
Undergraduate diploma /degree	0.00	0.14	0.16	0.45	0.51	0.60	0.00
Higher degree/postgraduate diploma	0.00	0.00	0.00	0.03	0.13	0.40	1.00

Source: Derived from ABS the Survey of Education and Work, 2003 and Transition from Education to Work, 1993

Appendix H

Logistic models of impact of timing of acquisition of educational qualifications on employment rates

A logistic model was used with the dependent variable employment status (1 if employed, 0 otherwise).

Age was taken as mid-points of the ranges 40–44, 45–49, 50–54, 55–59 and 60–64.

To capture the time since qualification was acquired, the category 'before 1980' was assigned a value of 21 years and the category '2000 to survey date' was assigned a value of one year. The remaining categories were taken as years since the midpoints of the ranges 1980–1984, 1985–1989, 1990–1994 and 1995–1999.

Table H1: Males aged 40–64 years, with postgraduate degree, graduate diploma or certificate, degree or advanced diploma

N= 1558

Variable	Estimate	Standard error
Intercept	-11.8074	5.5790
Age	0.6018	0.2225
Age squared	-0.00631	0.00224
Years since qualification acquired	0.2332	0.1248
Years since qualification acquired * age interaction	-0.00455	0.00246

Table H2: Males aged 40–64 years, with certificate III or IV

N=1520

Variable	Estimate	Standard error
Intercept	-2.2963	5.3099
Age	0.2972	0.1851
Age squared	-0.00431	0.00178
Years since qualification acquired	-0.0235	0.1725
Years since qualification acquired * age interaction	0.000617	0.00347

Table H3: Males aged 40–64 years, with certificates I or II or certificate not further defined or level unknown

N=420

Variable	Estimate	Standard error
Intercept	-15.1256	7.7199
Age	0.7646	0.3026
Age squared	-0.00832	0.00295
Years since qualification acquired	-0.1224	0.1265
Years since qualification acquired * age interaction	0.00173	0.00240

Table H4: Females aged 40–64 years, with postgraduate degree, graduate diploma or certificate, degree or advanced diploma

N= 1547

Variable	Estimate	Standard error
Intercept	-15.2073	4.1293
Age	0.7170	0.1615
Age squared	-0.00731	0.00160
Years since qualification acquired	0.0839	0.0816
Years since qualification acquired * age interaction	-0.00262	0.00165

Table H5: Females aged 40–64 years, with certificate III or IV

N=432

Variable	Estimate	Standard error
Intercept	-33.5497	7.6461
Age	1.4258	0.3052
Age squared	-0.0143	0.00304
Years since qualification acquired	0.0828	0.1173
Years since qualification acquired * age interaction	-0.00255	0.00242

Table H6: Females aged 40–64 years, with certificate I or II or certificate not further defined or level unknown

N=797

Variable	Estimate	Standard error
Intercept	-16.3843	5.1848
Age	0.7572	0.2031
Age squared	-0.00803	0.00200
Years since qualification acquired	0.00936	0.0867
Years since qualification acquired * age interaction	-0.00063	0.00174

Source: Derived from the ABS Survey of Education and Training Experience, 2001

Appendix I

Logistic models of impact of various education variables on employment rates

A logistic model was used with the dependent variable employment status (1 if employed, 0 otherwise).

Age was taken as midpoints of the ranges 40–44, 45–49, 50–54, 55–59 and 60–64.

To capture the time since qualification was completed, the category 'before 1980' was assigned a value of 21 years and the category '2000 to survey date' was assigned a value of one year. The remaining categories were taken as years since the midpoints of the ranges 1980–1984, 1985–1989, 1990–1994 and 1995–1999.

To determine the number of additional non-school qualifications, a variable was constructed from the variable number of non-school qualifications. In calculating the number of additional qualifications obtained, we subtracted one from each level, as this accounted for the highest qualification. In the case of a postgraduate degree or graduate diploma or certificate, we assumed that individuals had obtained two qualifications which accounted for their highest level of education. Hence, to attain a postgraduate degree or graduate diploma or certificate, one typically has to complete a prior qualification, such as a bachelor degree. The resulting levels for those who had obtained an additional qualification were 'one additional qualification' and 'two or more additional qualifications'.[10] These levels were entered as separate zero-one dummies, where for the former level, the value of one indicated one additional qualification, and for the latter level, one indicated two or more additional qualifications.

The number of non-school qualifications enrolled in 2001 variable was reconstructed so that the levels were enrolled in 2001 or not enrolled in 2001. It was entered as a zero-one dummy variable (1 if enrolled in 2001, 0 otherwise).

To capture whether individuals have obtained a qualification since their highest qualification, the variable 'most recent qualification different from highest qualification' was entered as a zero-one dummy (1 if an individual's most recent qualification is different from the highest qualification attained, 0 otherwise).

[10] In the case of a postgraduate degree or graduate diploma or certificate, the resulting variable for those who had obtained an additional variable was 'one or more additional qualifications'.

Table I1: Males aged 40–64 years, with postgraduate degree or graduate diploma or certificate

N= 513

Variable	Estimate	Standard error
Intercept	-11.1966	11.3920
Age	0.5895	0.4558
Age squared	-0.00637	0.00457
Years since qualification acquired	0.3026	0.2352
Age * time since qualification acquired interaction	-0.00508	0.00449
One or more additional qualifications	0.4851	0.3472
Latest qualification not highest qualification	-1.0469	0.4045
Intent to enrol in the future	0.3178	0.5305
Currently enrolled	-1.1204	0.4598
Incomplete award (1–5 years study)	12.6225	472.6
Incomplete award (< 1 years study	0.2690	1.0780

Table I2: Males aged 40–64 years, with degree or advanced diploma

N= 1045

Variable	Estimate	Standard error
Intercept	-13.0276	6.6099
Age	0.6342	0.2633
Age squared	-0.00665	0.00268
Years since qualification acquired	0.2538	0.1590
Age * time since qualification acquired interaction	-0.00461	0.00318
One additional qualifications	0.2479	0.2765
Two or more additional qualifications	0.4547	0.3576
Latest qualification not highest qualification	-0.5415	0.3357
Intent to enrol in the future	0.00527	0.3247
Currently enrolled	-0.3753	0.3655
Incomplete award (1–5 years study)	13.6611	610.1
Incomplete award (< 1 years study	-0.0412	0.5873

Table I3: Males aged 40–64 years, with certificate III or IV

N= 1520

Variable	Estimate	Standard error
Intercept	-1.3799	5.3723
Age	0.2648	0.1869
Age squared	-0.00393	0.00180
Years since qualification acquired	-0.00137	0.1754
Age * time since qualification acquired interaction	-0.00001	0.00353
One additional qualification	0.0519	0.2695
Two or more additional qualifications	0.1279	0.3523
Latest qualification not highest qualification	0.0328	0.3169
Intent to enrol in the future	-0.2044	0.2509
Currently enrolled	-0.8562	0.3242
Incomplete award (1–5 years study)	-0.9571	0.6117
Incomplete award (< 1 years study	-0.2160	0.5760

Table I4: Males aged 40–64 years, certificate I or II or certificate not further defined or level unknown

N= 420

Variable	Estimate	Standard error
Intercept	-16.2838	7.8506
Age	0.8223	0.3082
Age squared	-0.00897	0.00301
Years since qualification acquired	-0.1429	0.1305
Age * time since qualification acquired interaction	.00208	0.00245
One additional qualification	0.6740	0.4029
Two or more additional qualifications	-0.3104	0.4472
Latest qualification not highest qualification	-0.2661	0.4976
Intent to enrol in the future	-0.0112	0.3787
Currently enrolled	-0.4369	0.4839
Incomplete award (1–5 years study)	-0.2437	0.8403
Incomplete award (< 1 years study	-0.1758	0.7004

Table I5: Females aged 40–64 years, with postgraduate degree or graduate diploma or certificate

N= 436

Variable	Estimate	Standard error
Intercept	4.4198	9.0260
Age	-0.0502	0.3537
Age squared	3.251E-6	0.00348
Years since qualification acquired	0.1375	0.1730
Age * time since qualification acquired interaction	-0.00351	0.00340
One or more additional qualifications	0.6347	0.3175
Latest qualification not highest qualification	-0.0657	0.3703
Intent to enrol in the future	0.0880	0.4096
Currently enrolled	-0.0701	0.4835
Incomplete award (1–5 years study)	13.0198	428.5
Incomplete award (< 1 years study	0.0618	0.7170

Table I6: Females aged 40–64 years, with degree or advanced diploma

N= 1111

Variable	Estimate	Standard error
Intercept	-19.4136	4.8421
Age	0.8746	0.1890
Age squared	-0.00893	0.00188
Years since qualification acquired	0.0848	0.1000
Age * time since qualification acquired interaction	-0.00238	0.00204
One additional qualification	0.5341	0.1996
Two or more additional qualifications	0.4273	0.3068
Latest qualification not highest qualification	0.2247	0.2795
Intent to enrol in the future	0.00780	0.2047
Currently enrolled	-0.5068	0.2162
Incomplete award (1–5 years study)	0.6782	0.5549
Incomplete award (< 1 years study	-0.3136	0.3618

Table I7: Females aged 40–64 years, with certificate III or IV

N= 432

Variable	Estimate	Standard error
Intercept	-34.5662	7.7653
Age	1.4538	0.3089
Age squared	-0.0145	0.00308
Years since qualification acquired	0.0903	0.1193
Age * time since qualification acquired interaction	-0.00245	0.00246
One additional qualification	0.3315	0.3765
Two or more additional qualifications	0.3000	0.5416
Latest qualification not highest qualification	-0.2663	0.5048
Intent to enrol in the future	0.0511	0.3128
Currently enrolled	0.5460	0.4332
Incomplete award (1–5 years study)	-1.0511	0.8621
Incomplete award (< 1 years study	0.4033	0.6178

Table I8: Females 40–64 years, with certificate I or II or certificate not further defined or level unknown

N= 797

Variable	Estimate	Standard error
Intercept	-15.4730	5.2563
Age	0.7379	0.2055
Age squared	-0.00797	0.00202
Years since qualification acquired	-0.00871	0.0885
Age * time since qualification acquired interaction	-0.00029	0.00178
One additional qualification	0.1496	0.2799
Two or more additional qualifications	0.9943	0.5333
Latest qualification not highest qualification	-0.8972	0.4189
Intent to enrol in the future	-0.4272	0.2264
Currently enrolled	-0.4511	0.2830
Incomplete award (1–5 years study)	-0.7322	0.6302
Incomplete award (< 1 years study)	0.9809	0.6560

Source: Derived from the ABS Survey of Education and Training Experience, 2001

Appendix J

Logistic models of impact on training on employment rates, people who had a wage or salary job over the last 12 months

A logistic model was applied to people who had a wage or salary job in the last 12 months, with the dependent variable employment status (1 if employed, 0 otherwise).

Age was taken as midpoints of the ranges 40–44, 45–49, 50–54, 55–59 and 60–64.

The variable 'number of training courses completed' was taken as 1, 2, 3, 4, 5 and 6 and mid-points of the ranges 7–8 and 9–10 and the category '11 or more' was assigned the value of 11. This variable was entered as a continuous variable and as a dummy variable (1 if had completed a training course, 0 otherwise).

Likelihood ratio tests were calculated as follows:

LR=-2(ln L0-ln L1), where ln L0 is the maximum likelihood of the model K, age and age squared, L1 is the likelihood function of the model K, age, age squared, number of training courses (dummy) and number of training courses (continuous). The test statistics are provided under the following tables, which provide the regression results. Those in bold are jointly significant at the 5% level.

Table J1: Males aged 40–64 years, with postgraduate degree or graduate diploma or certificate

N= 376

Variable	Estimate	Standard error
Intercept	32.5825	35.7452
Age	-0.9011	1.3038
Age squared	0.00643	0.0118
Number of training courses completed (dummy)	-0.1553	1.0425
Number of training courses completed (continuous)	0.4689	0.4455

The likelihood ratio = 3.74

Table J2: Males aged 40–64 years, with degree or advanced diploma

N= 718

Variable	Estimate	Standard error
Intercept	-27.6715	11.5870
Age	1.2568	0.4577
Age squared	-0.0129	0.00443
Number of training courses completed (dummy)	0.1396	0.7381
Number of training courses completed (continuous)	0.6654	0.3908

The likelihood ratio = **20.47**

Table J3: Males aged 40–64 years, with certificate III or IV

N= 812

Variable	Estimate	Standard error
Intercept	-4.0583	9.5902
Age	0.3436	0.3751
Age squared	-0.00419	0.00361
Number of training courses completed (dummy)	0.2936	0.5728
Number of training courses completed (continuous)	0.2982	0.2715

The likelihood ratio = **8.58**

Table J4: Males aged 40–64 years, with certificate I or II or certificate not further defined or level unknown

N= 235

Variable	Estimate	Standard error
Intercept	-12.1485	14.4421
Age	0.5917	0.5661
Age squared	-0.00618	0.00544
Number of training courses completed (dummy)	-6.1388	40.0240
Number of training courses completed (continuous)	7.5136	40.0033

The likelihood ratio = **19.90**

Table J5: Males aged 40–64 years, with Year 11 or 12 only

N= 360

Variable	Estimate	Standard error
Intercept	-1.3335	19.8830
Age	0.1073	0.8159
Age squared	-0.00052	0.00827
Number of training courses completed (dummy)	0.6463	0.7675
Number of training courses completed (continuous)	0.1429	0.2796

The likelihood ratio = 3.84

Table J6: Males aged 40–64 years, with Year 10 only or less

N= 744

Variable	Estimate	Standard error
Intercept	-15.2906	8.3813
Age	0.7126	0.3298
Age squared	-0.00716	0.00319
Number of training courses completed (dummy)	0.7381	0.5702
Number of training courses completed (continuous)	0.2100	0.2605

The likelihood ratio = **13.49**

Table J7: Females aged 40–64 years, with postgraduate degree or graduate diploma or certificate

N= 341

Variable	Estimate	Standard error
Intercept	2.4274	16.7542
Age	0.0842	0.6506
Age squared	-0.00172	0.00623
Number of training courses completed (dummy)	0.9926	0.6692
Number of training courses completed (continuous)	0.0447	0.1486

The likelihood ratio = 4.16

Table J8: Females aged 40–64 years, with degree or advanced diploma

N= 736

Variable	Estimate	Standard error
Intercept	-14.1165	11.7097
Age	0.6726	0.4697
Age squared	-0.00674	0.00464
Number of training courses completed (dummy)	0.9578	0.4976
Number of training courses completed (continuous)	0.0437	0.1152

The likelihood ratio = **9.51**

Table J9: Females aged 40–64 years, with certificate III or IV

N= 260

Variable	Estimate	Standard error
Intercept	-36.4287	14.6612
Age	1.5485	0.5907
Age squared	-0.0154	0.00586
Number of training courses completed (dummy)	0.2198	0.6040
Number of training courses completed (continuous)	0.1512	0.1920

The likelihood ratio = 2.79

Table J10: Females aged 40–64 years, with certificate I or II or certificate not further defined or level unknown

N= 456

Variable	Estimate	Standard error
Intercept	4.6933	12.4750
Age	-0.0458	0.4968
Age squared	-0.00016	0.00490
Number of training courses completed (dummy)	0.5458	0.5698
Number of training courses completed (continuous)	0.1554	0.2496

The likelihood ratio = **6.11**

Table J11: Females aged 40–64 years, with Year 11 or 12 only

N= 398

Variable	Estimate	Standard error
Intercept	-10.1373	14.8385
Age	0.5981	0.5902
Age squared	-0.00690	0.00579
Number of training courses completed (dummy)	-0.0746	1.0814
Number of training courses completed (continuous)	0.7565	0.6678

The likelihood ratio = **8.09**

Table J12: Females aged 40–64 years, with Year 10 only or less

N= 970

Variable	Estimate	Standard error
Intercept	-6.4641	7.4037
Age	0.3728	0.2913
Age squared	-0.00400	0.00283
Number of training courses completed (dummy)	0.6295	0.4030
Number of training courses completed (continuous)	0.1268	0.1687

The likelihood ratio = **12.98**

Source: Derived from the ABS Survey of Education and Training Experience, 2001

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ISBN 1 920896 29 5 web edition