The role of VET in preventing the scarring effect of youth joblessness

MELBOURNE INSTITUTE OF APPLIED ECONOMIC AND SOCIAL RESEARCH

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About the research

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The role of VET in preventing the scarring effect of youth joblessness

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Up until the global financial crisis in late 2008, youth unemployment in Australia had been at its lowest recorded level since the 1970s. However, at just over 8%, this was still twice the rate for all people. Following the downturn, unemployment rates for those aged 15–24 years have increased to around 10%, a figure still twice that for all people. Young people are more vulnerable to potential unemployment as they are new entrants to the labour market. Unemployment becomes particularly problematic if it increases the chance that the individual is more likely to be subsequently unemployed.

Using data from the 1995 and 1998 cohorts of the Longitudinal Surveys of Australian Youth (LSAY), this report examines the extent to which a previous period of unemployment determines current unemployment. If unemployment can be attributed to an earlier spell of unemployment, we describe that earlier event as having a 'scarring effect'. The period of investigation is 2001–06. The two cohorts are used to investigate if and how scarring differs between cohorts facing different labour market conditions. Given that having no or low skills and qualifications can contribute to unemployment, the authors also examined the extent to which post-school educational qualifications can mitigate the adverse impacts of the scarring effect of a period of unemployment.

Key messages

✧ Scarring effects, in terms of prior unemployment playing a role in subsequent unemployment, do exist. However, they diminish as time since being unemployed passes, and no scarring occurs after a year in employment.

✧ In general, having a post-school qualification, at any level, will lessen the scarring effect of unemployment. For the older cohort, but not the younger cohort, completion of a recognised post-school VET qualification does appear to offer protection against scarring.

✧ Scarring effects are more pronounced in females than in males and for the younger (1998) cohort. A stronger tendency for women to have a series of jobs of shorter duration, and, for the younger cohort, a lesser number of years to gain work experience, are plausible explanations.

✧ The probability of being unemployed in any given month does reduce during the period 2001−06, more likely due to the members of the cohorts gaining greater work experience.

Tom Karmel
Managing Director, NCVER

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Executive summary

This report focuses on the scarring effect of prior unemployment for Australian youth. It does not address scarring at a psychological level (that is, reduced levels of happiness), but purely concentrates on the increased risk of being unemployed today due to prior unemployment. This is an ongoing concern for policy-makers of all persuasions. Preventing repeated or entrenched unemployment in the first place would be desirable, but equally it is important to understand how scarring effects vary for different individuals. Recognising these differences enables scarce resources to be directed to where scarring is most prevalent. The recent global economic downturn has only made the issue of youth unemployment and scarring more pressing, as new labour market entrants are disproportionally affected when demand for labour drops.

In this report we use the 1995 and 1998 (Y95 and Y98) cohorts from the Longitudinal Surveys of Australian Youth (LSAY). Individuals are followed from the moment they complete their schooling and study; that is, the early years of their working career when they are fully committed to the labour market.

The probability of being unemployed over time is examined through econometric modelling. The scarring effects are captured by the inclusion of indicators for prior unemployment. Additional factors of influence that drive unemployment probabilities over time represent educational attainment, ability, parental background information, ethnicity, geographical information, personal characteristics, and time and cohort effects.

The general pattern that emerges is that scarring effects are larger for women than for men and are larger for the Y98 cohort than the Y95 cohort. For the Y95 cohort, the scarring effects are reduced to almost zero when prior unemployment occurred six (or more) months ago. For the Y98 cohort the scarring effects are much reduced when prior unemployment occurred six (or more) months ago.

The study found that the three-month scarring effect for young females from the Y95 cohort who have completed Year 12 but who have no post-school qualifications is close to nine percentage points. That is, a female in this group would have a nine-percentage point higher probability of being unemployed today if she were unemployed three months ago. For their male counterparts, the scarring effect is just over six percentage points. Changing the schooling level from Year 12 to Year 10, holding all else equal, will slightly increase the scarring effect further by less than one percentage point.

Possession of post-school qualifications is shown to reduce the three-month scarring effects for all levels of post-school qualifications. In the case of a certificate I/II or diploma, the reduction is largest, at almost one-and-a-half percentage points and also statistically significant at conventional levels.

A female from the Y98 cohort with Year 12 but no post-school qualifications will have a scarring effect that is almost two percentage points lower than a similar female from the Y95 cohort (whose scarring effect was close to nine percentage points). However, for the Y98 cohort, possession of a certificate I/II increases the scarring effect by more than three percentage points, relative to a female from the Y98 cohort with no post-school qualifications.

Increasing the lag of prior unemployment from three to six months reduces the scarring effects. For a female from the Y95 cohort who completed Year 12 but who has no post-school qualifications, the scarring effect decreases to just below three percentage points—from about nine percentage points for the three-month lag. Post-school qualifications are again shown to reduce the scarring effect. In practical terms, for women with any form of post-school qualifications, the scarring effect of unemployment six months ago is effectively nil. However, substantial scarring effects do remain for females from the Y98 cohort, of up to eight percentage points for women with Year 11 schooling and certificate I/II post-school qualifications.

Any level of post-school qualification in the Y95 cohort will lead to a reduction in this three-month scarring effect. This reducing effect of any post-school qualification on the scarring effect of prior unemployment is only present for the Y95 cohort. As was the case for females in the Y98 cohort, post-school qualifications actually increase the scarring effect, with the exception of a bachelor degree or higher. In the case of the latter, the scarring effect is reduced. It is also the only level of post-school qualification for which the effect is found to be statistically significant.

At the point where an episode of prior unemployment occurred six months earlier, any remaining scarring effects for males in the Y95 cohort are barely perceptible, and only a small scarring effect can be identified for the Y98 cohort when the young males have post-school qualifications at a level lower than bachelor degree.

We find strong evidence for seasonality effects and the business cycle. The first quarter is the quarter with the highest probability of being unemployed, holding all else constant, with the probability peaking in March for both males and females. The calendar year indicators capture the role of the business cycle and are shown to be both statistically and economically important. Relative to the reference year, 2001, the probability of being unemployed in a given month steadily and sharply reduces in subsequent years, so much so that the probability of being unemployed in a given month is about five to six percentage points lower in 2006 than it is in 2001. Of course, part of this could be capturing the effect of the cohorts ageing and gaining work experience.

Although males experience smaller scarring effects than females, both are shown to benefit from vocational education and training (VET) acting as a buffer to insulate them, in part, from scarring effects. However, this only holds in the case of the Y95 cohort, but not the (younger) Y98 cohort. It thus seems that VET at very early stages in the career (that is, at younger ages) may actually increase scarring effects, but that over time a recognised post-school qualification does indeed work as a buffer to insulate individuals from scarring effects. The current emphasis on school completion and the goal to halve the proportion of Australians without at least certificate III-level qualifications by 2020 are consistent with a policy objective of reducing scarring effects for young people.

Introduction

This report describes the persistence of unemployment for Australian youth and the amount of scarring it causes. Scarring, as defined here, is the extent to which previous unemployment increases the risk of future unemployment. The role of VET is made explicit, given our hypothesis that the scarring effect will differ substantially for young people with a VET qualification from those without; and for those with a VET qualification, differences may exist by the level of education and/or the field of education. The hypothesis—to be tested—is that possession of a VET qualification will diminish scarring effects. In other words, having a VET qualification will limit the negative impact of a current unemployment spell on future employment probabilities.

Specifically, the key research questions to be addressed are:

1) Are individuals with a VET qualification who have experienced previous unemployment periods more, less, or equally likely to experience periods of unemployment in the future compared with individuals who also experienced previous unemployment periods but who do not have such qualifications?

2) How does this vary by the type of VET, both level and field of education, and/or other factors such as gender?

3) What is the magnitude of any such scarring effects?

Policy concerns related to the scarring effect come to the fore in gloomy economic times. Indeed, the recent global economic downturn has led the Australian Fair Pay Commission to conclude that '… the Commission's chief concern is that an increase in minimum wages may exacerbate the forecast increase in unemployment' (2009, p.12). In relation to the downside risk of the sharply weakening global economy, it had earlier come to the following conclusion:

> The scarring effects of unemployment magnify the costs associated with this downside risk. Unemployment tends to affect more severely those people who are already vulnerable—low-paid and low-skilled workers. Many people who become unemployed during a recession do not re-enter paid employment and instead become long-term unemployed or leave the labour force. Therefore, the Commission considers that its main priority in this decision is to protect jobs in the short term and help job seekers to be competitive in the labour market.
> (Australian Fair Pay Commission 2009, p.6)

The federal government is equally concerned. Kate Ellis, the then Minister for Early Childhood Education, Child Care and Youth, addressed the National Press Club on 12 August 2009 (International Youth Day):

> Evidence shows us that young individuals who face prolonged periods of unemployment can face phenomena known as the scarring effect, where a young person's long-term employability is permanently damaged by the onset of early unemployment. And, indeed, the OECD has identified that long-term unemployment for young persons can not only be costly for the individual but it comes with a massive price tag for the whole nation and the whole economy. So what this all boils down on is that it is incumbent upon government to ensure that young Australians remain productively engaged during this time of economic downturn, and that they're not left to languish on the unemployment queue. So that's what we've done.
> (Ellis 2009)

So although there seems to be robust agreement that (youth) unemployment ideally is to be avoided and that young people at risk can be identified in terms of socioeconomic indicators, much less is known about how such scarring effects vary by the level of vocational education and training or field of education and training. This report will make inroads into closing that gap in the knowledge base.

The report is structured as follows. In the next section we first discuss existing Australian and international research related to the scarring effect of unemployment; this is followed by a description of the data and some cross-tabulations on the incidence of unemployment for different levels of educational attainment and qualifications. The remainder of the report sets out the economic modelling approach in general terms and details the factors incorporated in the models that predict the unemployment probability for young Australians. After the results from the economic modelling exercise have been discussed, the final section contains some concluding remarks and makes some observations about the policy implications of our findings.

Results from previous studies

This section discusses some previous work related to the scarring effects of unemployment and the broader subject of school-to-work transitions. The studies pertaining to unemployment and scarring use a variety of data sources. The studies relating to the broader subject of transition from school to work and early labour market outcomes overwhelmingly use the Longitudinal Surveys of Australian Youth (LSAY). We narrowly focus on Australian studies to place our own analysis in the proper Australian context, but we do very briefly mention two international studies. One of these studies, Arulampalan, Booth and Taylor (2000), is very frequently referenced in work on scarring effects. The other, Audas, Berde and Dolton (2005), is a study specifically addressing scarring effects on young people.

Australian studies

Thapa (2004) analyses the 'risk' of unemployment of male immigrants to Australia relative to the native-born. Using data from 1990 and 2001 he analyses both the changes over time between, and the robustness of, results across model specifications. Due to data limitations, the estimations to analyse changes over time are basic logit regressions for the propensity to be unemployed using a limited set of covariates available in both datasets. However, using the first (2001) wave of the Household Income and Labour Dynamics in Australia (HILDA) Survey, he is able to control for more (and sometimes better measures of) covariates used in the basic logistic regressions. Specifically, the extended model allows the individual's labour market exposure and work history information to be included.

Thapa (2004) does not use the term 'scarring' and, importantly, does not explicitly control for prior unemployment episodes. Instead, the proportion of time not in the labour force is used. This is derived for two time periods—in the last year, and over the time since leaving full-time education for the first time. He finds that greater absence from the labour force over the longer time of the entire working-age horizon increases the propensity to be unemployed in 2001, but the effect is not significant. It is, however, positive and significant in the case of absence from the labour force in the past year.

Le and Miller (1999) analyse the probability of being unemployed using data from the Survey of Employment and Unemployment Patterns (SEUP) in Australia, a longitudinal survey of individuals aged 15 to 59 years covering the period 1994 to 1997. They use a logit regression to categorise individuals according to their risk of unemployment and validate this categorisation using information on the amount of time individuals subsequently spent looking for work. Upon realising that among those with the most intense level of job seeking a disproportionate number of individuals had never worked before, had spent considerable time looking for work in the previous year, and had a greater chance of being unemployed just prior to the period under review, they augmented their initial logit regressions with the respondent's labour market history.

Le and Miller (1999) describe these models for unemployment, which include lagged unemployment, as inertia models and argue that models of youth unemployment estimated by Miller and Volker (1987) and Junankar and Wood (1992) fall into the category of inertia models.

Reinterpreting the results in Miller and Volker (1987) and Junankar and Wood (1992) in terms of scarring effects, Le and Miller conclude that:

> The result that past periods of unemployment affect the current probability of being unemployed from the perspective of the inertia model of Nakamura and Nakamura [1985] suggests that the unobserved factors that influence labour market behaviour are quite important in the Australian labour market. Moreover, the pattern of effects reported in Junankar and Wood (1992) indicates that more recent labour market experience is more important in this regard than more distant labour market experience. This is consistent with the finding reported by Nakamura and Nakamura (1985) that only recent labour market history is important in forecasting current labour market activity. (Le & Miller 1999, p.61)

The results of Le and Miller's own analysis confirm this. They include two variables to capture the labour market histories—one measuring the duration of job seeking in the previous year and one measuring the number of years individuals had looked for work since they first left full-time education. Results show that the probability of being unemployed increases by 0.1 of a percentage point with each extra day the individual looked for work in the previous year. This is quite a substantial scarring effect, since it implies an individual who spent 50 days looking for work in the previous year has a predicted rate of unemployment of 15%, almost double the rate for a person who did not look for work in the previous year. It is also highly statistically significant. On the other hand, an extra year of job seeking since the individual had first left full-time education increases the probability of being unemployed by one percentage point and is only borderline statistically significant.

Le and Miller (1999) in summary thus conclude that: 'These results indicate that unemployment is characterised by inertia. That is, the current unemployment outcome is directly linked with the lack of success in finding employment in the previous period. Hence, this inertia or "scar" effect is quite dominant in the Australian labour market' (Le & Miller 1999, p.66).

Carroll (2006) studies what influences the probability that someone will leave unemployment using duration models. He estimates a proportional hazards model with a flexible piecewise constant baseline (both with and without Heckman Singer type unobserved heterogeneity) as well as a Cox regression.

Like Thapa (2004) he uses data from the Household Income and Labour Dynamics in Australia Survey, but is able to use the first two waves and the job calendar. Apart from the usual variables included in models for unemployment, such as educational attainment, geographic location and country of birth, he also includes previous unemployment experience. He finds there is a substantial scarring effect with an unemployment experience before an individual's current spell of unemployment that lowers the exit rates from unemployment to employment. It is highly statistically significant and quite large, with coefficient estimates suggesting that past unemployment experience lowers the hazard rate by 27% in the case of the Cox regression to as much as 56%, that is, cuts the exit probability in half for the specification with the piecewise constant proportional hazard model that incorporates unobserved heterogeneity.

Carroll (2006) is able to explain about 20% of the decline in the hazard using a rather complete set of explanatory variables, which leads him to conclude that '… either unobserved characteristics are potentially important or that some scarring is occurring' (Carroll 2006, p.312). Carroll could have been more forceful in his conclusion and argued that it is both, since the effect of previous unemployment on hazard rates in the current unemployment period is robust to controls for unobserved heterogeneity.

Knights, Harris and Loundes (2002) use data from the Australian Longitudinal Survey (ALS), which covered the period 1985 to 1988 to study individual labour market dynamics. They place great emphasis, right from the start, on the nature of the relationship between previous and current labour market outcomes when they ask '… is the course of the relative disadvantage of an

unemployed worker the mere *experience* of being unemployed (state dependence), or alternatively can it be attributed to observed or unobserved individual heterogeneity?' (2002, p.284).

They find that the only variables that significantly affect employment outcomes are educational attainment, geographic location and past employment. Using four distinct subgroups—high- and low-educated males and females—they essentially estimate a probit regression on unemployment, with lagged unemployment as an additional explanatory variable and a random effect. Parameter estimates indicate that past employment status, estimated by the employment status one year ago, significantly predicts current employment outcomes. They identify as particularly noteworthy the apparent scarring effect of unemployment, with results for high-education females showing that unemployment in the base period is associated with a 5.3% probability to be observed unemployed one year on (relative to 4.2% for a person who was employed in the base period), but that this scarring effect rapidly declines and wears off by the fourth year. High-educated males suffer from an identical scarring effect, with the spread in the unemployment probability one year on conditional on being unemployed or employed in the base period, also about one percentage point (for women the spread was 5.3% to 4.2%, or 1.1%).

Estimating the models on the samples of low-educated males and females only leads to an upward shift in the probability of being unemployed, but are otherwise characterised by the same scarring effects. In summary, Knights, Harris and Loundes (2002) show that scarring effects are substantial and robust to the inclusion of unobserved heterogeneity, but are rapidly declining over time and don't last.

As the last Australian study that is primarily concerned with unemployment we briefly mention the study by Doiron and Gorgens (2008). Using data from the Australian Youth Survey 1989−94, they study the magnitude and form of the causal relationship between past labour market experiences and future outcomes, distinguishing three labour force states: employment, unemployment and out of the labour force. They find that, for youth without post-secondary education, having experienced an employment spell in the past increases the probability of future employment and, similarly, unemployment spells raise the probability of future unemployment, although the duration of past spells does not matter. They also find that the magnitude of the effects of past employment and unemployment spells is similar, which means that the beneficial effects of an employment spell can be easily negated if followed by an unemployment spell. Although Doiron and Gorgens (2008) spent a great deal of effort on capturing the richness of different past labour market spells on future labour market outcomes, they only control for a limited set of basic characteristics, such as age and marital status, and do not distinguish between the various levels of VET.

The following four studies discussed next relate to the much broader topic of young people's early career experiences and the school-to-work transition and are mostly (but not exclusively) based on data from the Longitudinal Surveys of Australian Youth (LSAY).

McMillan and Marks (2003) examine the process of school leaving and the transition from school to post-school education, training and the labour market, with a special emphasis on young people who do not stay on at school to complete Year 12. The study is based on data from LSAY 1995, which follows a group of young people who were in Year 9 in 1995. The authors find that in some regards school non-completers fare better than school completers who did not enter higher education[1]: they are more likely to be in full-time employment, receive higher hourly earnings, display greater job stability, and report being in the type of job they would like as a career. However, on other counts, non-completers experience less successful transitions from school than completers. Compared with completers not in higher education, male non-completers are more likely to be unemployed, and female non-completers are more likely to be outside the labour force. Nevertheless, after controlling for a range of social background and educational factors, the direct effect of school completion on unemployment becomes less clear. The odds of completers being

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[1] Higher education is the term used by McMillan and Marks (2003) and, although not explicitly defined, can be interpreted as university, or tertiary education.

unemployed are not significantly different from those of early school leavers, other things being equal. The study also finds that literacy and numeracy skills have strong influences on school non-completion and also have effects on subsequent labour market outcomes. Young people who scored higher on the literacy and numeracy tests were much less likely to leave school before Year 12 and less likely to be unemployed.

Marks, Hillman and Beavis (2003) followed the experiences of a cohort of young people over five years during their early to mid-20s, between 1996 and 2000. These young people were born in 1975 and participated in the Youth in Transition (YIT) longitudinal study between 1989 and 2002. Multivariate analyses were carried out to examine the main influences on the proportion of time in full-time work, unemployment and in other marginal activities (part-time work and not in the labour force). Prior experiences of full-time work and, to a lesser extent, qualifications, have a positive impact on subsequent labour market outcomes. Completion of Year 12 also has a positive effect. Even after controlling for prior experience of full-time work, the completion of Year 12 increased the time spent in full-time work and reduced the time spent looking for work. Of the qualifications examined, a university degree had the strongest effect on subsequent time spent in full-time work, but it afforded little protection against unemployment or participation in marginal activities (that is, part-time work, not in the labour force or unemployed). After controlling for prior full-time work experience, a TAFE (technical and further education) certificate had a positive effect on the time spent in full-time employment, but also marginally increased the time spent looking for work.

Marks, Hillman and Beavis (2003) also find a scarring effect of unemployment, but it is important to realise what kind of scarring effect this captures. The unemployment measure Marks, Hillman and Beavis (2003) used is the proportion of time in unemployment between leaving school and 1995. It is very common for school leavers to experience a spell of unemployment, especially just after completing Year 12, and one could argue that such spells, between leaving school and the first job, are different from unemployment spells experienced once an individual's labour market career has actually begun. Keeping in mind that the scarring effect is based on the period between leaving school and 1995, Marks, Hillman and Beavis (2003) show that a 10-percentage point increase in time spent unemployed between leaving school and 1995 was associated with a two-to-three-percentage point decrease in time spent in full-time employment. Subsequent analysis showed that this scarring effect weakens over time. That is, the scarring effects on the proportion of time spent in full-time employment are larger in 1996 than they are in 2000. To conclude, Marks, Hillman and Beavis (2003) emphasise the benefits of gaining full-time employment early in the school-to-work transition and show that unemployment has a scarring effect because it increases the probability of subsequent unemployment.

Lamb and McKenzie (2001) examine the transitions from school to work for those who did not obtain a university or TAFE associate diploma or above and who were not enrolled for such qualifications in the seventh post-school year. Post-school education, training and employment experiences are examined using data from the Australian Youth Survey (AYS). Although there is a great diversity of pathways, the results reveal relatively smooth transitions for the majority of these young people. About two-thirds obtain a full-time job on leaving school (20%), after an apprenticeship or traineeship (13%), after further study (11%), or after a short period of unemployment (24%). However, school-to-work transitions are not smooth for the remaining one-third. Seven per cent experience long-term unemployment, while another 5% remain in part-time work and a further 7% never really enter the labour market. In addition, a large group (13%) experience extended periods of unemployment (up to four years) before full-time work is achieved. Among the young people who experience difficult school-to-work transitions, many are low school achievers and many did not complete Year 12. The likelihood of experiencing long-term unemployment or of not being able to secure full-time work decreases with the number of years of schooling. The study also shows that negative experiences in the first post-school year have lasting adverse effects. The relationship between initial activities and long-term outcomes applies to all young people, independent of the success in the transitions from school to full-time work. Lamb

and McKenzie (2001, p.ix) reveal that 'less than two-fifths of young men whose main first year activity is somewhat problematic experience a successful pathway over the next six years'. By contrast, 95% of young men whose principal activity in the first post-school year is an apprenticeship or traineeship subsequently experience a successful pathway characterised by lasting full-time employment.

A companion report focuses on young people who obtained a university degree or TAFE diploma or who were enrolled for such qualifications in the seventh post-school year (Lamb 2001). The report shows that the transitions to full-time work are relatively smooth for graduates. The main results are summarised as follows: (i) 45% obtained a full-time job after graduation and remained in full-time work; (ii) 9% deferred study, entered the workforce, returned to study and then after graduation re-entered the workforce; (iii) 7% studied part-time while working and remained in work during the seven years; (iv) 16% were still in study in the seventh post-school year; and (v) 17% experienced a brief interruption in the transition to work, with periods of unemployment or not looking for work after graduation, although this was less than 12 months and these graduates were in stable full-time work by their mid-20s. The transitions to stable full-time work were found to be problematic for only about 6% of graduates.

International studies

We briefly discuss two international studies as these studies are directly relevant to the modelling approach taken in this report. Arulampalam, Booth and Taylor (2000) estimate the scarring effect of unemployment using the first five waves of data from the British Household Panel Survey (BHPS). They, too, define scarring as the persistence in unemployment and are interested in how scarring affects young individuals differently from older individuals. They find that, for young males (under 25 years of age), less than a quarter (20%) of the (annual) persistence in unemployment (that is, being recorded as unemployed in two consecutive waves of the BHPS) observed in the raw data, is caused by scarring. For older men it is almost 40%.

Audas, Berde and Dolton (2005) used the same model as Arulampalam, Booth and Taylor (2000), but they differ in their definition of time. The sample in Audas, Berde and Dolton consists of Hungarian matriculation graduates from 1994 who were surveyed between October 1997 and February 1998 and filled out retrospective monthly labour market diaries. These monthly data allow the authors to experiment with the timing of the lagged unemployment episode to investigate how the scarring effect changes over time. They find that more recent unemployment spells have stronger scarring effects, but overall their findings are similar to Arulampalam, Booth and Taylor, in that they find evidence of a scarring effect for, in this case, Hungarian youth.

Our analysis also uses monthly employment status and thus is closest in spirit to Audas, Berde and Dolton (2005). The next section will discuss the data used in more details.

Data and descriptive statistics

This section introduces the data used for the analysis and broadly describes the post-school education options in Australia. One of the main objectives of this report is to study the scarring effect of unemployment for young people and how this scarring effect varies by education level and qualifications. We therefore first tabulate, over time, the highest level of schooling and the highest level of post-school education obtained. This helps to put the unemployment experiences by education level into perspective. We next tabulate the proportion of young people experiencing at least one month of unemployment by age and education level attained, and for those who do experience unemployment, the average number of months in unemployment by age and education level attained. The latter two tables are key descriptive tables, as they show what proportion of young people potentially suffers from scarring effects (for which an experience of unemployment is required to begin with) and how deep the scarring may be (by measuring the level of exposure to unemployment).

The data for this study consist of the 1995 and 1998 cohorts of the LSAY data (Y95 and Y98).[2] Both cohorts are nationally representative samples of about 14 000 Year 9 students in 1995 and 1998, respectively. The data were collected using stratification, with the major stratum the state of schooling in 1995 (1998). The selection of students within states was proportional relative to the school sector, with students from small states over-sampled and students from large states under-sampled. Three school sectors (government, Catholic and independent schools) were used as strata.

Following the collection of written information in the first year for each cohort, students were contacted annually by telephone and asked a range of questions across the following sections: school; transition from school; post-school study; work; job history; job-search activity; not in the labour force; living arrangements, finance and health; and general attitudes.

The focus of the questionnaires changes as the cohort ages, with a greater emphasis on employment and post-school education in the later years of the survey.

There are three sets of weights provided in the LSAY data. Sample weights reflect the original sample design and ensure that the sample matches the population from which the sample was drawn. The distribution of stratum levels (state and school sector) matches that of the original population. The second set of weights are attrition weights. These account for most of the non-random respondent attrition and are based on overall achievement quartiles and gender, and reweight to wave 1. The final set of LSAY weights for each wave combine sampling and attrition weights.

Winship and Radbill (1994) argue that sampling weights must generally be used to derive unbiased estimates of univariate population characteristics, but the decision about their use in regression analysis is much more complicated and controversial. They argue that, if sampling OLS (ordinary least squares) weights are purely a function of independent variables included in the model,

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[2] See the user guides for Y95 and Y98 (NCVER 2009a, 2009b) for a complete discussion of the data and further references to technical papers pertaining to the sample design.

unweighted OLS estimates are preferred. We therefore do use the combined weights for descriptive tables 1 to 3, but do not use weights in the dynamic probit regressions.[3]

Since we know that attrition is not random, sample attrition causes a potential concern. For instance, it would be expected that individuals with a more fractious employment history are more likely to drop out of the sample. This would imply that those remaining in the sample are characterised by more stable labour market histories, including stable unemployment, resulting in an overestimation of scarring effects. If, instead, individuals who are persistently unemployed are more likely to drop out of the sample, the scarring effects would be underestimated. It is not clear, *ex ante*, which way the bias would go, but it is very encouraging that unweighted versions of tables 1 to 3 are by and large very similar to the weighted versions.

We use the retrospective questions tracing employment and unemployment status that are asked at each interview. Retrospective information is collected up to the previous interview and, typically, this means that the status in the previous 17 to 19 months is available at each interview (that is, there is quite a lot of overlap with multiple observations for a single particular month, but occasionally there are also gaps). We use only data that cover the months from January 2001 for the Y95 cohort, and July 2001 for the Y98 cohort, up to December 2006. Focusing on the later waves of the LSAY avoids capturing unemployment periods occurring when the respondent's main focus may not yet be the labour market. The reason for not using the Y98 data all the way up to 2008 is that, from 2007 onwards, the Y98 cohort was not asked retrospectively about working and not working, but instead was asked about working full-time or not. In order to determine unemployment status it is not sufficient to know only about full-time employment; hence, the truncation of the 1998 cohort at December 2006. In the methodology section we describe in more detail how our sample for the economic modelling is constructed.

Because the tables in this section report results by education level it is useful to briefly discuss the various levels of post-school qualifications we distinguish, except for the university-level degrees of bachelor's, master's and doctorate, which are internationally well known and used. Certificates I−IV provide practical skills, with higher certification levels signifying more advanced qualifications. Certificates I and II provide individual basic skills upon which to build further. Certificates III and IV are more advanced and replaced the previous trade certificates. Apprenticeships for trades such as plumbing are typically at certificate IV level.

Certificate I−IV courses are typically provided at a TAFE college. According to the Australian Qualifications Framework (2007) courses for a certificate I would teach skills that would prepare a person to perform a defined range of activities, most of which may be routine and predictable. Applications may include a variety of employment-related skills, including preparatory access and participation skills, broad-based induction skills and/or specific workplace skills. Certificate II courses would teach skills that would prepare a person to perform in a range of varied activities or involve knowledge application where there is a clearly defined range of contexts in which the choice of actions required is usually clear and there is limited complexity in the range of options to be applied and where they perform a prescribed range of functions involving known routines and procedures and some accountability for the quality of outcomes. Applications may include some complex or non-routine activities involving individual responsibility or autonomy and/or collaboration with others.

Certificate III competencies would cover selecting, adapting and transferring skills and knowledge to new environments and providing technical advice and some leadership in resolution of specific problems. This would be applied across a range of roles in a variety of contexts with some complexity in the extent and choice of options available. Here a defined range of skilled operations, usually within a range of broader related activities involving known routines, methods and

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[3] In our case the combined weights for sampling and attrition, at least in part, depend on several variables included as explanatory variables in our specification.

procedures, where some discretion and judgment is required in the selection of equipment, services or contingency measures and within known time constraints is performed.

Finally, certificate IV competencies would cover a broad range of varied activities or application in a wider variety of contexts, most of which are complex and non-routine. Leadership and guidance are involved when organising activities of self and others. People undertaking certificate IV also contribute to technical solutions of a non-routine or contingency nature and perform a broad range of skilled applications, including evaluating and analysing current practices, developing new criteria and procedures for performing current practices and providing some leadership and guidance to others in the application and planning of the skills.

Diplomas and advanced diplomas are generally one-to-two year programs with practical courses. Associate degrees take about the same amount of time, but the program is of a more academic than practical nature. Graduate certificates and diplomas require a bachelor degree or higher as a prerequisite. An example is a Graduate Certification of Education, which many teachers in Australia hold.

Table 1 reports the highest school and post-school levels of education attained by age. The sample covers the period from 2001 to 2006. School level is obtained from the derived variable XHSL, while derived variable XHEL indicates post-school education level. Although observations for those aged between 20 and 23 years old are from both cohorts, ages 17 to 19 are only covered by Y98, while ages 24 to 26 are only covered by Y95. This explains why the number of observations drops at younger and older ages.[4]

The percentage of young people with a highest school level of Year 12 increases sharply between ages 17 and 19, as young people complete secondary school. It then remains at over 80% from age 20 onwards.

The percentage of young people with no post-school education is decreasing sharply with age as young people acquire further education. This corresponds to the increases in the percentage of those with an educational attainment at the certificate I level and above.

Table 2 reports the proportion of youths who have experienced at least one month of unemployment during the year by highest level of schooling, highest level of post-school education, and age. Since many young people were still full-time students rather than in the labour market, those studying full-time are excluded. Overall, as respondents get older, the proportion experiencing a month of unemployment declines for all education levels, although a clear levelling-off in the decline is present towards older ages. The starting point of the levelling-off depends on the highest level of post-school qualifications. For instance, respondents with a highest level of post-school qualification of certificate I see the proportion with at least one month of unemployment level off from age 20. For those with a certificate III it is from age 22. For those with higher levels of post-school education, the point of levelling off is even later.

At age 26, when most young people had completed full-time education, the highest proportions of youth experiencing at least one month of unemployment during the year were found for those with an education level below Year 12, those with a certificate III, and those with a postgraduate degree. Those with other certificate levels do better, particularly those with a certificate IV, for whom the proportion experiencing one month (or more) of unemployment is similar to that of those with a bachelor degree.

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[4] Individuals appear multiple times in table 1 and in other tables in this section, as they cross-tabulate variables of interest by age and education level.

Table 1 **Highest level of schooling and highest level of post-school education attained by age (LSAY 1995 and 1998 combined, %)**

	17	18	19	20	21	22	23	24	25	26
School level										
Year 10 or below	11.0	11.0	10.1	9.7	9.7	9.4	9.6	9.3	8.4	8.0
Year 11	86.8	47.4	10.0	9.0	9.0	8.8	8.5	8.5	7.6	6.9
Year 12	2.2	41.7	79.8	81.3	81.3	81.8	81.9	82.2	84.0	85.1
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Post-school education										
None	96.4	93.2	85.9	71.8	60.3	48.7	40.0	33.5	29.9	26.8
Certificate I	0.4	0.6	1.2	1.9	2.4	2.8	2.7	2.5	2.0	2.4
Certificate II	1.5	2.0	4.2	5.4	5.3	5.1	5.0	4.6	4.3	3.8
Certificate III	0.7	1.8	4.0	6.8	7.6	8.6	8.3	7.4	6.7	6.5
Certificate IV	0.1	0.5	1.4	2.6	3.2	3.7	4.4	4.4	4.9	5.3
Certificate − level unknown	0.8	1.4	1.7	3.8	5.4	5.2	6.0	7.3	6.7	5.8
Diploma	0.1	0.4	1.4	4.7	6.7	7.9	8.5	8.1	8.2	8.7
Bachelor degree	0.0	0.0	0.2	2.7	8.7	17.2	23.4	28.6	32.0	33.2
Graduate diploma/ graduate certificate	0.0	0.0	0.0	0.3	0.4	0.7	1.3	2.6	3.3	4.0
Postgraduate degree (PhD/master's)	0.0	0.0	0.0	0.0	0.0	0.3	0.5	1.0	2.0	3.5
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
No. of observations	4 188	7 453	6 748	9 449	11 165	9 992	6 763	4 200	3 836	1 656

Note: All numbers weighted using the combined attrition and sample weights. Weights do not affect the total sample size.

Table 2 **Proportion of youths experiencing at least one month of unemployment by age and education level attained, excluding full-time students (LSAY 1995 and 1998 combined, %)**

	17	18	19	20	21	22	23	24	25	26
School level										
Year 10 or below	-	29	34	18	14	17	16	11	10	13
Year 11	72	33	34	27	19	17	13	11	13	18
Year 12	39	29	25	17	15	13	10	7	6	8
Post-school education										
None	57	30	28	20	15	15	13	10	8	10
Certificate I	-	42	26	8	5	8	9	8	6	9
Certificate II	-	23	26	23	19	18	17	7	8	12
Certificate III	-	28	29	14	14	10	7	9	10	14
Certificate IV	-	11	19	17	16	15	10	9	6	7
Certificate − level unknown	-	31	25	15	13	11	9	7	7	2
Diploma	-	21	33	12	18	15	13	5	8	12
Bachelor degree	-	-	57	13	17	15	10	7	6	6
Graduate diploma/ graduate certificate	-	-	46	14	14	10	3	6	2	10
Postgraduate degree (PhD/master's)	-	-	-	-	-	6	11	7	7	21
All	**52**	**29**	**28**	**18**	**15**	**14**	**11**	**8**	**7**	**9**
No. of observations	8	1 452	2 592	4 574	6 380	6 618	5 015	3 474	3 214	1 380

Note: All numbers weighted using the combined attrition and sample weights. Weights do not affect the total sample size.

Finally, table 3 reports the time spent in unemployment by age and education level for those who did experience unemployment during the year, while excluding those still in full-time education. Again, there is a decreasing trend over time, with the average time spent in unemployment ranging from 4.0 months for those aged 19 years old, to only 2.6 months for those 26 years of age.

Obviously, as time goes by, youth entering the labour market do so with higher education levels, while those already in the labour market gain work experience.

Table 3 **Average number of months in unemployment by age and education level attained, excluding full-time students and those with no unemployment spells (LSAY 1995 and 1998 combined)**

	17	18	19	20	21	22	23	24	25	26
School level										
Year 10 or below	-	4.7	4.1	4.3	3.7	4.2	4.5	4.0	3.7	3.7
Year 11	2.0	4.7	4.8	4.1	4.3	4.2	5.4	3.7	3.4	3.5
Year 12	1.9	3.7	3.8	3.7	3.4	3.5	3.4	3.0	2.6	2.3
Post-school education										
None	1.9	3.8	4.0	3.8	3.7	3.8	4.2	3.6	3.5	3.3
Certificate I	-	5.6	3.2	5.0	3.6	4.2	2.7	6.0	4.5	4.5
Certificate II	-	3.9	4.5	4.7	3.6	4.8	3.6	2.2	2.6	2.5
Certificate III	-	4.3	3.5	3.1	3.6	4.0	4.7	3.5	2.1	1.2
Certificate IV	-	1.6	4.0	4.0	3.7	4.1	3.8	3.6	3.4	3.0
Certificate − level unknown	-	5.5	2.5	4.1	3.7	4.0	4.1	3.7	1.6	2.2
Diploma	-	8.4	4.7	4.0	3.3	3.8	3.1	3.1	3.1	2.3
Bachelor degree	-	-	4.4	3.0	3.1	2.8	3.1	2.5	2.4	2.3
Graduate diploma/ graduate certificate	-	-	6.0	4.3	2.3	4.9	4.8	3.3	2.7	1.8
Postgraduate degree (PhD/master's)	-	-	-	-	-	1.3	2.7	1.1	2.6	3.5
All	1.9	3.9	4.0	3.9	3.5	3.7	3.8	3.2	2.8	2.6
No. of observations	4	428	715	818	972	922	564	283	231	122

Note: All numbers weighted using the combined attrition and sample weights. Weights do not affect the total sample size.

Methodology

This section discusses the econometric model used to investigate the scarring effect of unemployment. Before discussing the model in greater detail we present the factors included in the model that are expected to be driving the probability of being unemployed over time. These factors of influence are broken down in groups that represent educational attainment, ability, parental background information, ethnicity, geographical information, personal characteristics, and time and cohort effects. Specifically, our explanatory variables are:

Highest level of schooling obtained

Year 10 or below

Year 11

Year 12 (we use this as the reference case)

Highest level of post-school education obtained

No post-school qualifications (we use this as the reference case)

Certificate I or II

Certificate III

Certificate IV

Certificate, level unknown

(Advanced) Diploma

Bachelor degree or higher

Field of study (in case of post-school education)

Arts and humanities (we use this as the reference case)

    Society and culture

    Creative arts

    Food, hospitality and personal services

    Mixed field programs

'Hard' sciences

    Natural and physical sciences

    Information technology

    Engineering and related technologies

    Architecture and building

    Agriculture, environmental and related studies

'Soft' sciences

    Health

    Education

    Management and commerce

Ability

Maths ability test scores (measured at wave 1)

    Scaled from 1 to 20

Reading ability test scores

    Scaled from 1 to 20

Aspiration to complete Year 12 (last measured at wave 3)[5]

Parental background variables

Parental education level
  Less than Year 12 (we use this as the reference case)
  Year 12
  Trade or technical qualification
  Degree

Migration status

Being born in a mainly English-speaking country

Being born in a non-English-speaking country

Level of remoteness

Living in a metropolitan area (we use this as the reference case)

Living in a regional area

Living in a rural or remote area

Other personal attributes/Household composition

Respondent living with their parents

Presence of (a) child(ren)

Married or in a de facto relationship

Indigenous status

Calendar time effects

Indicators for each month (January is the reference month) to capture seasonality patterns in unemployment.

Indicators for each calendar year (2001 is the reference year) to capture the business cycle, that is, the strong economic upswing after the global economic slowdown at the start of the millennium.

Cohort effects

Dummy indicator to indicate an observation is from the Y98 cohort

Interactions of several of the variables described above with the Y98 indicator.

Interactions of the Y98 dummy with other variables, such as highest level of post-school qualification obtained, allow the effects of these factors to be different for the Y98 cohort from the effects for the Y95 cohort. We also allow the scarring effect to be different for those in the Y95 and Y98 cohorts, but to make the identification of the scarring effect explicit in our model it is necessary to describe the model used in more detail.

We distinguish between the highest level of schooling and the highest level of post-school education, since a single clear and non-controversial combined ranking is not possible. For example, it is not immediately clear if possession of a certificate III and completion of Year 10 is any better, or worse, than completion of Year 12 only. For this reason we separate school from post-school education. In our empirical specifications, explained in more detail below, we sometimes group post-school education levels, in particular certificate levels I and II and certificate levels III and IV, when interacted with the cohort dummy and the (lagged) unemployment dummy. We do this in order to ensure smooth convergence of the models.[6]

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[5] In the first two waves of the Y95 and Y98 respondents are asked at which year level they intend to leave school. In wave 3 they are explicitly asked if they intend to go on to, or complete, Year 12. In subsequent waves this information is no longer collected. The information in the first three waves thus enables a construction of a single variable that indicates the stated intention to complete Year 12.

[6] Models of this size, with many explanatory variables, have the potential to be over-specified. We therefore paid particular attention to the robustness of our parameter estimates by varying the specification. Combining the certificate levels in some instances was a direct result of such robustness checks.

For individuals who completed post-school education we also control, in a broad sense, for the field of study. We do this to control for, potentially, different markets for young people with an arts qualification and young people with a science qualification, and the different demands for these skills in the economy. Different demands for their skills will affect their propensity to be unemployed, holding everything else constant. For the sciences we also split health, education and management and commerce from sciences such as engineering or architecture and building to further distinguish 'hard' sciences from 'soft' sciences.

Overview

Identifying and quantifying the scarring effect of unemployment is the key aim of this project. To address the scarring effect of past unemployment we follow the methodology used in Arulampalam, Booth and Taylor (2000) and Audas, Berde and Dolton (2005). In those papers the authors analyse the persistence of unemployment by modelling the probability for individual i to be unemployed at time t, denoted by UE_{it}, as a function of unemployment status at time t-1 (UE_{it-1}) and a series of observable characteristics (X_{it}) using a Probit regression. The observed unemployment status, UE, is denoted as a 0/1 variable, with 1 indicating the person is unemployed and 0 if not. The observable characteristics in X_{it} are deemed to influence the propensity to be unemployed and the ones included in our specification are those described earlier. The fact that these characteristics differ by individual is denoted by the subscript i. Similarly, the fact that these characteristics can take on different values over time is denoted by the subscript t. Finally, the error term, denoted by v_{it}, is assumed to follow a normal distribution with a mean of 0 and a standard deviation of σ_v. We can formally express the relationship as:

$$UE_{it} = \alpha + X_{it}'\beta + \gamma UE_{it-1} + v_{it} \qquad (1)$$

where the α, β and γ are parameter vectors with γ denoting the scarring effect.

In this model, the data are restricted to persons in the labour force, that is, in work or looking for work. This restriction is necessary so that the '0' (not unemployed) refers only to being in work and does not also capture individuals who have left the labour market altogether (for example, stay-at-home mothers). Since we are interested in the scarring effect of unemployment when individuals have well and truly begun their employment careers, we only use data from January 2001 for the Y95 cohort, and July 2001 for the Y98 cohort. For both cohorts the data stop at December 2006. For the Y95 cohort this is because the data collection has ended, but for the Y98 cohort, as we have seen, it is because from 2007 onwards no monthly retrospective information is collected on working per se, but only on working full-time. Because there may be systematic differences by cohort, we effectively estimate our models separately by cohort by interacting each of the explanatory variables by a Y98 dummy variable. These interaction variables express how the effect of each variable for the Y98 cohort differs from the effect for the Y95 cohort.[7]

We also exclude those individuals who are still studying towards a qualification or a degree, or who are observed to be studying for a qualification or degree at a point in the future. Specifically, we use the variable 'XFTS', which records student status at each interview, and let individuals enter the estimation sample from the first January after being observed not to be studying. If supplementary information about the month that study ended is available, respondents enter the sample in the month following the conclusion of their studies, that is, earlier than the following January.[8]

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[7] Many of the interaction variables turned out to be statistically insignificant, economically inconsequential (i.e. very small), or both. For the final specifications, for which results are discussed in the next section, only the interactions directly related to the scarring effects, the highest level of post-school qualification, and the broad field of study were included. For those variables, interactions with the Y98 indicator did play a role for either males or females.

[8] We experimented by universally applying the rule of entering the sample on the first January after finishing studying, even if we have precise information available on when the study ended. The results were shown to be very robust and did not change in any meaningful way.

The nature of the scarring effect

Observed persistence in unemployment can be driven by two mechanisms. The first mechanism is the causal relationship between previous unemployment and future unemployment. That is, a person currently experiencing unemployment will, in future, behave differently from an identical person not experiencing unemployment. This is the scarring effect. The second mechanism is driven by individuals' underlying propensity to work. Some of that propensity to work is influenced by factors that are observed, such as the stated intention to complete Year 12 or other variables that reveal preferences; hence, the inclusion of such variables in X_{it} to control for this. However, other factors may be very hard to quantify and/or are unobservable to the researcher. This second mechanism is captured by the inclusion of random effects. Specifically, the error term in equation (1) consists of a time-invariant individual-specific component (μ_i) and a normally distributed random error ε_{it} with a mean of 0 and a standard deviation of σ_ε.

$$v_{it} = \mu_i + \varepsilon_{it} \qquad (2)$$

The standard random-effects model assumes that μ_i is uncorrelated with X_{it}. As this is potentially restrictive, we adopt the Mundlak-Chamberlain approach and allow a correlation between μ_i and the observed characteristics in the model by assuming a relationship between μ_i and the means of the time-varying variables in X_{it}:

$$\mu_i = \overline{X_i}'\lambda + \psi_i \qquad (3)$$

where $\overline{X_i}$ contains the means of the time-varying variables in X_{it}, λ is a parameter vector and ψ_i is a normally distributed error with a mean of 0 and a standard deviation of σ_ψ.

One more aspect of the model specification that needs to be addressed is the so-called initial conditions problem. This problem arises because the start of the observation period (the unemployment status when the respondent first enters our sample) does not coincide with the start of the stochastic process generating unemployment experiences. Estimation of the model therefore requires a further assumption about the relationship between μ_i and UE_{i1}. If the initial conditions are correlated with μ_i, as is likely in our context, not addressing the initial conditions problem will lead to overstating the level of state dependence (that is, the estimate of γ in (1) will be larger than it actually should be). To solve the initial conditions problem we follow the suggestion by Wooldridge (2005). In the Wooldridge approach the relationship between μ_i and UE_{i1} is accounted for by modelling the distribution of μ_i given UE_{i1}. In summary, Equation (1) is estimated as a random effects probit with mean values of the variables changing over time ($\overline{X_i}$) and the unemployment indicator for when a person first entered our sample (UE_{i1}) as extra explanatory variables.

As Audas, Berde and Dolton (2005) show, scarring effects differ according to how much time has passed since the unemployment episode. Since we use monthly unemployment status we experiment with the length of the lag. It is important to realise that we simply measure unemployment status in a particular month and do not distinguish whether the observed unemployment is part of the same spell. For example, two adjacent monthly observations of a person being unemployed are likely observations of the same (single) unemployment spell. The probability that unemployment measured in the current period and measured 12 months prior are part of the same single unemployment spell is much smaller, but could nevertheless be the case. Apart from the one-month lag (UE_{t-1}), we also estimate a specification with a three-month lag (UE_{t-3}), a six-month lag (UE_{t-6}), and finally a 12-month lag (UE_{t-12}). As became apparent in the discussion of the literature, a very robust finding was that scarring effects decline over time; that is, the longer the lag between current and previous unemployment, the smaller the scarring effect. Each of these models is estimated[9] separately for men and women. The following section will report and discuss the findings.

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[9] Winship and Radbill (1994) argue that if sampling weights are purely a function of independent variables included in the model, unweighted OLS estimates are preferred. In our case the combined weights for sampling and attrition, at least in part, depend on several variables included as explanatory variables in our specification. We therefore do not use weights in the dynamic probit regressions.

Results

In this section, we focus our discussion on the effects of unemployment status in the models with three- and six-month lags. We have used the Average Partial Effects (APE) as these have an intuitive interpretation. The APE reflect the percentage-point increase in the probability of being unemployed (or decrease if APE is negative) as the explanatory variable changes from 0 (No) to 1 (Yes), while keeping all other variables at their observed values.[10] In the case of student achievement variables, the APE reflects the change in probability for a single unit increase (that is, a single unit increase in the math or reading score).

The full regression results (coefficients, z-values, and APE) are reported in the appendix. Although we focus our discussion on the effects of unemployment status in the models with three- and six-month lags, the appendix also presents results of the effects of unemployment status with one- and twelve-month lags. Finally, the appendix also contains tables for the scarring effects for a given level of schooling, post-school qualification, and cohort.

In the following tables we present the APE values, with asterisks denoting the level of statistical significance.

Scarring effects

The results of main interest are the scarring effects, captured by the impact of lagged unemployment status. As these scarring effects are different for males and females, estimates are obtained for both groups separately and presented side by side for ease of comparison. The scarring effects also differ by educational attainment. Estimates are therefore obtained for different levels of schooling and post-school qualification achieved. Finally, all scarring effects are different for the Y95 and Y98 cohorts. All scarring results are displayed in table 4.

Three-month lag (females)

The top line of table 4 presents the scarring effect, measured in percentage points, for the reference group[11]—young females from the Y95 cohort who have completed Year 12 but who have no post-school qualifications. It is close to nine percentage points (8.74). That is, a female in this group would have a nine-percentage point higher probability of being unemployed today if she were unemployed three months ago.

The interaction terms following the top line of table 4 provide the key to computing the scarring effects for women with different characteristics. For example, taking the same reference female and only changing the schooling level from Year 12 to Year 10, holding all else equal, will slightly increase the scarring effect by less than one percentage point (0.68).

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[10] APE are also often referred to as mean marginal effects.

[11] In a regression it is often necessary to select a reference group to avoid what is known as 'perfect collinearity'. In its simplest form, a regression that includes a constant, but which also controls for gender, can only include either a variable to indicate 'male' or 'female', but can't have a constant, a male dummy *and* a female dummy. Principally our problem is no different. We need to pick one level of schooling and one level of post-school qualifications to determine our reference category.

Table 4   Selected APE (percentage points) on the probability of being unemployed—scarring effects

	3-month lag		6-month lag	
Dependent variable	Male	Female	Male	Female
UE(t-'x')	6.29***	8.74***	1.59***	2.71***
UE(t-'x') * Y98	-0.42	-1.70***	-0.80*	-1.49***
[ref: UE(t-'x') * Year 12]				
UE(t-'x') * Year 10 or below	1.18**	0.68	-0.01	-0.79
UE(t-'x') * Year 11	-0.63	-1.46***	-0.65	-1.27*
[ref: UE(t-'x') * no post-school qualification]				
UE(t-'x') * Cert. I/II	-0.55	-1.43**	-0.91	-3.33***
UE(t-'x') * Cert. III/IV	-1.06	-0.39	-2.41***	-1.75**
UE(t-'x') * Cert. unknown	-1.71**	-1.10	-2.57***	-1.34
UE(t-'x') * Diploma	-0.37	-1.30*	-0.05	-0.46
UE(t-'x') * BA or higher	-0.19	-1.03	-0.08	-2.22***
[ref: UE(t-'x') * Y98 * Year 12]				
UE(t-'x') * Y98 * Year 10 or below	-0.97	1.84**	0.18	2.05**
UE(t-'x') * Y98 * Year 11	0.38	3.57***	1.02	3.14***
[ref: UE(t-'x') * Y98 * no post-school qualification]				
UE(t-'x') * Y98 * Cert. I/II	1.08	3.30***	3.16**	8.06***
UE(t-'x') * Y98 * Cert. III/IV	1.83	-0.26	4.40***	3.17**
UE(t-'x') * Y98 * Cert. unknown	1.28	2.52	2.32	6.40**
UE(t-'x') * Y98 * Diploma	1.23	-0.17	1.73	0.89
UE(t-'x') * Y98 * BA or higher	-2.50***	-1.16	-2.41**	0.84
[ref: UE(t-'x') * FoS Arts & humanities]				
UE(t-'x') * FoS Hard sciences	-0.05	0.19	0.49	2.23***
UE(t-'x') * FoS Soft sciences	0.85	-0.17	1.84**	-0.08
[ref: UE(t-'x') * Y98 * FoS Arts & humanities]				
UE(t-'x') * Y98 * FoS Hard sciences	0.80	1.13	-1.18	-2.62***
UE(t-'x') * Y98 * FoS Soft sciences	-0.19	1.60*	-1.97**	-0.20

Notes: The *, **, and *** denote statistical significance of the raw coefficient estimate underlying the APE at the 10%, 5% and 1% level, respectively.

The 'x' in the *UE(t-'x')* terms take on either 3 or 6 for the unemployment status three and six months prior, respectively.

Our reference female does not have post-school qualifications, but possession of such qualifications is shown to reduce the scarring effects for all levels of post-school qualifications. In the case of a certificate I/II or diploma, the reduction is largest, at almost one-and-a-half percentage points (-1.43 and -1.30, respectively) and also statistically significant at conventional levels.

The difference between the Y95 and Y98 cohorts is quite pronounced. A reference female (with Year 12 but no post-school qualifications) from the Y98 cohort will have a scarring effect that is almost two percentage points lower (-1.70) than a reference female from the Y95 cohort. This is good news for those in the Y98 cohort. However, for the Y98 cohort the impact of post-school qualifications is not as uniformly favourable as it is for the Y95 cohort. For the Y98 cohort, possession of a certificate I/II increases the scarring effect by more than three percentage points (3.30) relative to a reference female from the Y98 cohort (who has no post-school qualification).[12]

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[12] To paraphrase, a Y95 female with only Year 12 has a higher scarring effect than her Y98 counterpart, but the Y95 female will reduce the scarring effect by obtaining a certificate I/II, whereas the Y98 female would increase her scarring effect if she did the same.

Six-month lag (females)

The right-hand half of table 4 contains the results for the six-month lag. The scarring effect for the reference female (Y95, Year 12, no post-school) is now much reduced, from about nine percentage points for the three-month lag to just under three percentage points (2.71). This is to be expected since the more time that passes between the prior and the current employment status, the less relevant the prior employment status becomes, especially in the case of the youth labour market.

The reference female does not have post-school qualifications, but possession of such qualifications is again shown to reduce the scarring effects for all levels of post-school qualifications. In the case of a certificate I/II or bachelor degree, the reduction is largest, at more than two percentage points (-3.33 and -2.22) and is also highly statistically significant. When combined with the much-reduced scarring effect for the reference female, this implies that, for women with any form of post-school qualifications, the scarring effect of unemployment six months ago is effectively nil.

Not so in the case of the Y98 cohort. True, the scarring effect for a reference female from Y98 is even less, by one-and-a-half percentage points (-1.49), than the scarring effect for a Y95 reference female, but not having a Year 12 level of schooling (as does the reference female) increases it by two to three percentage points. Even more damaging for the Y98 cohort, a certificate I/II increases the scarring effect vis-à-vis a reference female from the Y98 cohort by eight percentage points (8.06).

Three-month lag (males)

The top line of table 4 shows that a young male from the Y95 cohort who has completed Year 12 but has no post-school qualifications (our reference male) has a scarring effect of just over six percentage points (6.29). That is, such a male would have a six-percentage point higher probability of being unemployed today if he were unemployed three months ago. This is lower than the corresponding scarring effect for similar females, which was estimated to be nine percentage points.

The scarring effect of six percentage points for the reference male would increase by about one percentage point (1.18) to just over seven percentage points if he had completed only Year 10 instead of Year 12. However, as was the case for women, any level of post-school qualification in the Y95 cohort will lead to a reduction in the scarring effect, as evidenced by the negative APE for the variables relating prior unemployment status with post-school qualification levels.

This reducing effect of post-school qualification on the scarring effect of prior unemployment is only present for Y95. As was the case for females, in the Y98 cohort post-school qualifications actually increase the scarring effect, with the exception of a bachelor degree or higher. In the case of the latter, the scarring effect is reduced and the effect of a bachelor degree is also the only level of post-school qualification for which the effect is found to be statistically significant.

Six-month lag (males)

At the point where an episode of prior unemployment occurred six months ago one can hardly identify any remaining scarring effects for males in the Y95 cohort. The only instance in which a small scarring effect is still present is for the Y98 cohort when the young males have post-school qualifications at a level lower than bachelor degree.

Tables A7 and A8 in the appendix present the scarring effects of prior unemployment for both men and women who have a specific level of schooling and post-school education and come from either the Y95 or the Y98 cohort. The general pattern that emerges is that scarring effects are larger for women than for men, are larger for the Y98 cohort than the Y95 cohort, are reduced to almost

zero when prior unemployment occurred six (or more) months ago and the respondent is from the Y95 cohort, and much reduced for the Y98 cohort.

Other effects

Although the scarring effects are of primary interest, the specifications also include a host of other variables that are included as controls. We will briefly discuss some aspects of their impact on the probability of being unemployed in any given month.

Apart from the relationship between prior unemployment indicators and education and qualification levels, we also control for the highest level of schooling and post-school qualifications obtained. These results are displayed in table 5. For both men and women, completing Year 11 is associated with approximately a one-and-a-half-percentage point higher probability of being unemployed in a given month, relative to Year 12 completion. Only for women does leaving school before completing Year 11 increase the probability of being unemployed in a given month, relative to Year 12 completion. The effects of post-school qualifications per se on the probability of being unemployed in a given month are only statistically significant for males, and then only for the Y98 cohort.

We find strong evidence for seasonality effects and the business cycle. The impact of these calendar-time effects is reported in table 6. The first quarter is the quarter with the highest probability of being unemployed, holding all else constant, with the probability peaking in March for both males and females. The seasonality pattern overall is slightly stronger for females than it is for males, but the pattern is the same in both cases. With the first quarter being the worst, the best months for employment are the months of September through November.

Table 5   Selected APE (percentage points) on the probability of being unemployed—education and qualifications

	3-month lag		6-month lag	
Dependent variable	Male	Female	Male	Female
[ref: Year 12]				
Year 10 or below	0.19	1.68***	0.22	2.08***
Year 11	1.48***	1.45***	1.65***	1.55***
[ref: no post-school qualification]				
Cert. I/II	-0.90	0.23	-1.08	0.62
Cert. III	-1.07	0.82	-1.12	1.20
Cert. IV	-0.92	-0.91	-1.31	-0.62
Cert. unknown	-1.23	1.60*	-1.41	1.85**
Diploma	0.33	-0.22	0.16	-0.19
BA or higher	-0.55	0.25	-0.49	0.41
Y98 * Cert. I/II	2.22*	-1.12	2.51*	-1.39
Y98 * Cert. III	0.92	-1.11	1.06	-1.50
Y98 * Cert. IV	3.43**	2.00	4.52**	1.71
Y98 * Cert. unknown	1.02	-1.88	1.12	-2.12
Y98 * Diploma	2.18*	-0.43	2.81**	-0.57
Y98 * BA or higher	3.32***	-0.39	3.47***	-0.59
[ref: FoS Arts & humanities]				
FoS Hard sciences	-0.77	-0.73	-0.83	-0.99*
FoS Soft sciences	-0.52	-0.19	-0.53	-0.24
[ref: Y98 * FoS Arts & humanities]				
Y98 * FoS Hard sciences	-0.97	0.35	-0.99	0.89
Y98 * FoS Soft sciences	-1.48	-0.54	-1.58	-0.51

Note: The *, **, and *** denote statistical significance of the raw coefficient estimate underlying the APE at the 10%, 5% and 1% level, respectively.

The year dummies capture the role of the business cycle and are shown to be both statistically and economically important. Relative to the reference year, 2001, the probability of being unemployed in a given month steadily and sharply reduces in subsequent years, so much so, that the probability of being unemployed in a given month is about five to six percentage points lower in 2006 than it is in 2001. Of course, part of this could be capturing the effect of our cohorts ageing and gaining work experience.

Table 6   Selected APE (percentage points) on the probability of being unemployed—calendar time

	3-month lag		6-month lag	
Dependent variable	Male	Female	Male	Female
[ref: 2001]				
2002	-1.18***	-0.78**	-1.22***	-0.70**
2003	-2.55***	-1.85***	-2.89***	-2.10***
2004	-4.28***	-3.04***	-5.04***	-3.60***
2005	-5.03***	-3.86***	-5.86***	-4.55***
2006	-5.64***	-4.50***	-6.56***	-5.27***
[ref: January]				
February	-0.09	0.02	-0.05	0.10
March	0.74***	0.58**	0.73***	0.58**
April	0.22	-0.23	0.32	-0.11
May	-0.31	-0.60**	-0.15	-0.39
June	-0.83***	-0.85***	-0.41*	-0.45*
July	-0.90***	-1.08***	-0.55**	-0.74***
August	-1.37***	-1.69***	-1.12***	-1.44***
September	-1.34***	-1.69***	-1.22***	-1.50***
October	-1.33***	-1.60***	-1.24***	-1.45***
November	-1.37***	-1.53***	-1.39***	-1.56***
December	-1.39***	-1.31***	-1.43***	-1.42***

Note: The *, **, and *** denote statistical significance of the raw coefficient estimate underlying the APE at the 10%, 5% and
1% level, respectively.

Table 7 reports the impact of the remaining variables on the probability of being unemployed. Of the three ability variables, only being good at maths plays a role, with a higher maths ability score being associated with a lower probability of being unemployed in a given month. The other variables relating to personal characteristics and household composition show that being married or in a de facto relationship reduces the probability of unemployment for males only, but having children increases it for both males and females.

Table 7   Selected APE (percentage points) on the probability of being unemployed—other variables

	3-month lag		6-month lag	
Dependent variable	Male	Female	Male	Female
Maths ability score	-0.13***	-0.12***	-0.14***	-0.14***
Reading ability score	0.02	-0.03	0.02	-0.04
Planned to complete Year 12	-0.08	-0.06	-0.04	0.00
[ref: Parental education less than Year 12]				
Father – Year 12	0.62	-0.40	0.64	-0.42
Father – Trade or technical	-0.04	-0.48	-0.07	-0.55
Father – Degree	0.20	0.02	0.25	0.03
Father – Education missing	2.65**	0.64	2.94**	0.77
Mother – Year 12	-0.15	0.59*	-0.11	0.67*
Mother – Trade or technical	-0.53	-0.36	-0.57	-0.43
Mother – Degree	-0.03	0.50	-0.08	0.57
Mother – Education missing	-1.36	0.14	-1.53	0.19
[ref: Australian born]				
Overseas born – mainly English-speaking country	0.09	1.98**	0.18	2.17**
Overseas born – non-English-speaking country	0.48	0.73	0.50	0.93
[ref: Metropolitan]				
Regional	0.23	0.15	0.29	0.18
Rural or remote	0.37	0.32	0.46	0.39
Indigenous	-0.08	0.87	-0.07	1.09
Lives with parents (t-1)	-0.01	-0.02**	-0.01	-0.03***
Has child(ren)	3.12***	4.15***	3.72***	4.57***
Child info missing	-0.94***	-0.39	-1.00***	-0.30
Married/de facto	-0.85***	0.00	-0.94***	-0.07
UE(t = 1) (initial condition)	26.85***	24.43***	29.37***	27.43***
Y98 * UE(t = 1) (initial condition)	-0.33	0.42	0.29	0.92
LSAY98 observation (Y98)	1.35***	2.57***	1.30***	2.73***

Note: The *, **, and *** denote statistical significance of the raw coefficient estimate underlying the APE at the 10%, 5% and 1% level, respectively.

Concluding remarks

This report set out to investigate the scarring effect of prior unemployment for young people in Australia. The scarring effect can manifest itself in a variety of ways, not least on a psychological level. In fact, for a lay person it is quite natural to think of the scarring effect as purely impacting on mental wellbeing. Although we certainly recognise the impact of unemployment on mental wellbeing, for the purpose of this report the scarring effect is interpreted in the classic economic sense of simply capturing the increased risk of being unemployed today due to prior unemployment.

Such scarring effects were indeed found to exist, but timing is important. Very recent episodes of unemployment have very large scarring effects. In fact, being unemployed in the previous month is such a strong predictor for being unemployed in the current month that it wipes out the impact of any other confounding factors. In contrast, episodes of unemployment that took place a year ago have no meaningful impacts. That is, the scarring effects are completely mitigated in the course of a year. Where the research was found to be most informative was the case in which prior unemployment occurred three to six months ago. Especially at three months the scarring effects were found to still be substantial. Taken together the results suggest that youth unemployment, from a longitudinal perspective, should really be considered a short-term concern to policy-makers and that attention should remain focused on reducing the incidence of long-term unemployment, which is known to be harmful.

Specifically for the Y95 cohort, the study found that the three-month scarring effect, measured in percentage points, for young females who have completed Year 12 but who have no post-school qualifications is close to nine percentage points. That is, a female in this group would have a nine-percentage point higher probability of being unemployed today if she had been unemployed three months ago. Possession of post-school qualifications is shown to reduce the three-month scarring effects for all levels of post-school qualifications. In the case of a certificate I/II or diploma, the reduction is largest, at almost one-and-a-half percentage points and also statistically significant at conventional levels. Increasing the lag of prior unemployment from three to six months reduces the scarring effects. In practical terms, for women with any form of post-school qualifications, the scarring effect of unemployment six months ago is effectively nil.

The average young male from the Y95 cohort who has completed Year 12 but who has no post-school qualifications has a three-month scarring effect of just over six percentage points. This is lower than the corresponding scarring effect for similar females. Any level of post-school qualification will lead to a reduction in this three-month scarring effect. At the point where an episode of prior unemployment occurred six months ago, any remaining scarring effects are barely perceptible.

Although males experience smaller scarring effects than females, both are shown to benefit from VET acting as a buffer to insulate them, in part, from scarring effects. However, this only holds in the case of the Y95 cohort, but not the (younger) Y98 cohort. It thus seems that VET at very early stages in the career (at younger ages) may actually increase scarring effects, but that over time a recognised post-school qualification does indeed work as a buffer to insulate individuals from scarring effects. The current emphasis on school completion and the goal to halve the proportion of Australians without at least certificate III level qualifications by 2020 are therefore consistent with a policy objective of reducing scarring effects for young people.

Notwithstanding the short-term nature of the scarring effect, a recurring pattern was that they tended to be larger for females and for the younger cohort. There is no obvious reason why the scarring effects should be larger for young females than it is for young males, but it could possibly reflect a stronger inclination for women to have a series of jobs of short duration alternating with episodes of unemployment at the start of their careers. The finding that younger cohorts have larger scarring effects can at least partially be explained by their having less opportunity to have amassed years of work experience and built a network. This in turn could make it more difficult to find new employment following an unemployment spell. Alternatively, the hypothesis that females are more inclined than men to have a series of short-duration jobs could also hold for the younger cohort in general. The finding that the younger cohort has larger scarring effects would in that case reflects the effort to find a good match with an employer, and not necessarily reflect any fundamental differences between cohorts.

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Appendix

Table A1   Results from (random effect) probits on the probability of being unemployed—one-month lag

Dependent variable: UE(t)	Females			Males		
	Coef.	Z-value	APE	Coef.	Z-value	APE
UE(t-1)	3.131***	40.370	60.54	2.742***	35.570	44.32
UE(t-1) * Y98	-0.339***	-3.576	-0.87	0.086	0.915	0.28
[ref: UE(t-1) * Year 12]						
UE(t-1) * Year 10 or below	0.149	1.264	0.49	0.216*	1.799	0.74
UE(t-1) * Year 11	0.102	0.817	0.33	0.127	1.162	0.42
[ref: UE(t-1) * no post-school qualification]						
UE(t-1) * Cert. I/II	-0.303**	-2.019	-0.82	-0.041	-0.218	-0.12
UE(t-1) * Cert. III/IV	-0.166	-1.133	-0.46	-0.365**	-2.251	-0.97
UE(t-1) * Cert. unknown	-0.462***	-2.814	-1.20	-0.305	-1.626	-0.83
UE(t-1) * Diploma	-0.163	-1.026	-0.46	0.151	1.003	0.49
UE(t-1) * BA or higher	-0.151	-0.930	-0.43	-0.158	-1.015	-0.45
[ref: UE(t-1) * Y98 * Year 12]						
UE(t-1) * Y98 * Year 10 or below	0.063	0.426	0.20	-0.397**	-2.567	-1.04
UE(t-1) * Y98 * Year 11	0.062	0.409	0.19	-0.282*	-1.915	-0.76
[ref: UE(t-1) * Y98 * no post-school qualification]						
UE(t-1) * Y98 * Cert. I/II	0.581***	2.708	2.42	0.289	1.140	1.03
UE(t-1) * Y98 * Cert. III/IV	0.151	0.781	0.50	0.548**	2.230	2.26
UE(t-1) * Y98 * Cert. unknown	0.575	1.546	2.38	0.746**	2.201	3.48
UE(t-1) * Y98 * Diploma	0.322	1.296	1.15	-0.042	-0.169	-0.13
UE(t-1) * Y98 * BA or higher	0.301	1.316	1.07	0.591**	2.176	2.50
[ref: UE(t-1) * FoS Arts & humanities]						
UE(t-1) * FoS Hard sciences	0.157	1.193	0.52	0.091	0.679	0.29
UE(t-1) * FoS Soft sciences	0.046	0.385	0.14	0.348**	2.240	1.27
[ref: UE(t-1) * Y98 * FoS Arts & humanities]						
UE(t-1) * Y98 * FoS Hard sciences	-0.001	-0.005	0.00	0.115	0.539	0.37
UE(t-1) * Y98 * FoS Soft sciences	0.027	0.146	0.08	-0.530**	-2.138	-1.35
[ref: 2001]						
2002	-0.031	-0.592	-0.11	-0.035	-0.695	-0.13
2003	-0.042	-0.784	-0.14	-0.085	-1.618	-0.31
2004	-0.124**	-2.210	-0.40	-0.269***	-4.775	-0.90
2005	-0.205***	-3.498	-0.65	-0.370***	-6.262	-1.18
2006	-0.278***	-4.561	-0.86	-0.420***	-6.905	-1.32
[ref: January]						
February	0.013	0.212	0.04	0.085	1.267	0.27
March	0.128**	2.079	0.44	0.252***	3.862	0.86
April	-0.035	-0.55	-0.11	0.130**	1.978	0.42
May	-0.059	-0.942	-0.19	0.013	0.192	0.04
June	-0.041	-0.662	-0.13	-0.015	-0.221	-0.04
July	-0.111*	-1.755	-0.35	-0.016	-0.233	-0.05

Dependent variable: UE(t)	Females			Males		
	Coef.	Z-value	APE	Coef.	Z-value	APE
August	-0.286***	-4.35	-0.84	-0.127*	-1.867	-0.37
September	-0.162**	-2.491	-0.49	-0.046	-0.680	-0.14
October	-0.098	-1.521	-0.31	0.006	0.083	0.02
November	-0.153**	-2.286	-0.47	-0.067	-0.955	-0.20
December	-0.085	-1.266	-0.27	-0.135*	-1.820	-0.39
[ref: Year 12]						
Year 10 or below	0.167***	2.904	0.54	0.127**	2.141	0.39
Year 11	0.065	1.209	0.20	0.233***	4.494	0.76
[ref: No post-school qualification]						
Cert. I/II	0.122	1.336	0.38	-0.046	-0.411	-0.14
Cert. III	0.172*	1.935	0.54	0.000	0.004	0.00
Cert. IV	-0.003	-0.021	-0.01	0.153	1.156	0.50
Cert. unknown	0.345***	3.786	1.18	-0.066	-0.596	-0.20
Diploma	-0.038	-0.433	-0.11	0.138	1.356	0.45
BA or higher	0.042	0.478	0.13	-0.147	-1.424	-0.42
Y98 * Cert. I/II	-0.351***	-2.623	-1.02	-0.011	-0.071	-0.04
Y98 * Cert. III	-0.252**	-2.062	-0.75	-0.244	-1.387	-0.69
Y98 * Cert. IV	-0.029	-0.171	-0.09	-0.054	-0.280	-0.16
Y98 * Cert. unknown	-0.641***	-2.920	-1.73	-0.103	-0.499	-0.30
Y98 * Diploma	-0.238*	-1.712	-0.71	0.019	0.114	0.06
Y98 * BA or higher	-0.226*	-1.786	-0.68	-0.012	-0.070	-0.04
[ref: FoS Arts & humanities]						
FoS Hard sciences	-0.176**	-2.311	-0.52	-0.257***	-3.086	-0.77
FoS Soft sciences	-0.073	-1.101	-0.22	-0.262***	-2.675	-0.78
[ref: Y98 * FoS Arts & humanities]						
Y98 * FoS Hard sciences	0.176	1.416	0.57	0.094	0.687	0.29
Y98 * FoS Soft sciences	0.008	0.076	0.02	0.183	1.175	0.60
Maths ability score	-0.016***	-2.921	-0.05	-0.019***	-3.293	-0.06
Reading ability score	-0.011**	-2.116	-0.03	-0.001	-0.118	0.00
Planned to complete Year 12	-0.048	-1.057	-0.15	0.017	0.366	0.05
[ref: Parental education less than Year 12]						
Father – Year 12	-0.027	-0.555	-0.08	0.074	1.360	0.23
Father – Trade or technical	-0.045	-1.062	-0.14	0.007	0.138	0.02
Father – Degree	-0.022	-0.422	-0.07	-0.004	-0.077	-0.01
Father – Education missing	0.166**	2.114	0.55	0.276**	2.235	0.94
Mother – Year 12	0.075*	1.841	0.23	-0.058	-1.281	-0.18
Mother – Trade or technical	0.019	0.371	0.06	-0.101	-1.526	-0.31
Mother – Degree	0.048	0.960	0.15	-0.03	-0.515	-0.09
Mother – Education missing	-0.021	-0.228	-0.06	-0.228*	-1.795	-0.66
[ref: Australian born]						
Overseas born − mainly English-speaking country	0.151*	1.664	0.49	0.059	0.626	0.19
Overseas born – non-English-speaking country	0.066	0.958	0.21	0.106	1.386	0.34
[ref: Metropolitan]						
Regional	0.024	0.663	0.07	0.044	1.073	0.13
Rural or remote	0.056	1.421	0.17	0.043	0.948	0.13
Indigenous	0.110	1.157	0.35	-0.029	-0.260	-0.09
Lives with parents (t-1)	0.002	0.875	0.01	0.000	-0.218	0.00

Dependent variable: UE(t)	Females			Males		
	Coef.	Z-value	APE	Coef.	Z-value	APE
Has child(ren)	0.156	1.622	0.51	0.242**	2.041	0.83
Child info missing	-0.121	-1.506	-0.35	-0.066	-0.808	-0.20
Married/de facto	0.053	1.066	0.16	-0.05	-0.786	-0.15
[Means of time-varying variables]						
Mean(lives with parents)	-0.027	-1.105		-0.025	-1.172	
Mean (Has child[ren])	0.103	0.883		-0.035	-0.188	
Mean (Child info missing)	0.101	0.767		-0.047	-0.339	
Mean (Married/de facto)	-0.176***	-2.600		-0.194**	-2.052	
UE(t = 1) (initial condition)	0.580***	9.757	2.42	0.835***	12.267	4.01
Y98 * UE(t = 1) (initial condition)	-0.062	-0.822	-0.18	-0.178**	-2.068	-0.51
LSAY98 observation (Y98)	0.345***	6.152	1.07	0.181***	3.326	0.56
Constant	-2.378***	-21.668		-2.456***	-21.399	
/lnsig2u	-1.852***	-14.546		-1.370***	-13.399	
rho	0.136	9.090		0.203	12.260	
Number of obs	136 197			134 004		
Number of groups	4 950			4 411		
Wald chi2(55)	13 579.42			12 021.63		
Prob > chi2	0.000			0.000		
Log likelihood	-6 512.701			-6 641.324		

Note: The *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.
The term 'lnsig2u' denotes the natural log of the variance. '*rho*' is given as *sig2u/(sig2u+1)* and gives the proportion of the total variance contributed by the panel-level variance component.

Table A2 Results from (random effect) probits on the probability of being unemployed—three-month lag

Dependent variable: UE(t)	Females			Males		
	Coef.	Z-value	APE	Coef.	Z-value	APE
UE(t-3)	1.134***	16.077	8.74	0.928***	12.881	6.29
UE(t-3) * Y98	-0.398***	-4.522	-1.70	-0.091	-1.053	-0.42
[ref: UE(t-3) * Year 12]						
UE(t-3) * Year 10 or below	0.131	1.132	0.68	0.227**	1.976	1.18
UE(t-3) * Year 11	-0.336***	-2.652	-1.46	-0.141	-1.309	-0.63
[ref: UE(t-3) * no post-school qualification]						
UE(t-3) * Cert. I/II	-0.325**	-2.269	-1.43	-0.121	-0.664	-0.55
UE(t-3) * Cert. III/IV	-0.081	-0.582	-0.39	-0.246	-1.525	-1.06
UE(t-3) * Cert. unknown	-0.242	-1.469	-1.10	-0.423**	-2.278	-1.71
UE(t-3) * Diploma	-0.292*	-1.924	-1.30	-0.08	-0.611	-0.37
UE(t-3) * BA or higher	-0.227	-1.460	-1.03	-0.04	-0.300	-0.19
[ref: UE(t-3) * Y98 * Year 12]						
UE(t-3) * Y98 * Year 10 or below	0.326**	2.15	1.84	-0.222	-1.475	-0.97
UE(t-3) * Y98 * Year 11	0.574***	3.631	3.57	0.078	0.547	0.38
[ref: UE(t-3) * Y98 * no post-school qualification]						
UE(t-3) * Y98 * Cert. I/II	0.538***	2.780	3.30	0.209	0.895	1.08
UE(t-3) * Y98 * Cert. III/IV	-0.053	-0.290	-0.26	0.337	1.474	1.83
UE(t-3) * Y98 * Cert. unknown	0.429	1.277	2.52	0.244	0.790	1.28
UE(t-3) * Y98 * Diploma	-0.034	-0.139	-0.17	0.235	1.086	1.23
UE(t-3) * Y98 * BA or higher	-0.259	-1.183	-1.16	-0.679***	-2.874	-2.50
[ref: UE(t-3) * FoS Arts & humanities]						
UE(t-3) * FoS Hard sciences	0.037	0.297	0.19	-0.011	-0.090	-0.05
UE(t-3) * FoS Soft sciences	-0.035	-0.307	-0.17	0.167	1.217	0.85
[ref: UE(t-3) * Y98 * FoS Arts & humanities]						
UE(t-3) * Y98 * FoS Hard sciences	0.209	1.071	1.13	0.158	0.838	0.80
UE(t-3) * Y98 * FoS Soft sciences	0.288*	1.667	1.60	-0.04	-0.182	-0.19
[ref: 2001]						
2002	-0.113**	-2.569	-0.78	-0.163***	-3.742	-1.18
2003	-0.287***	-6.222	-1.85	-0.382***	-8.472	-2.55
2004	-0.512***	-10.535	-3.04	-0.726***	-15.044	-4.28
2005	-0.692***	-13.506	-3.86	-0.910***	-18.060	-5.03
2006	-0.856***	-15.866	-4.50	-1.085***	-20.495	-5.64
[ref: January]						
February	0.003	0.059	0.02	-0.018	-0.369	-0.09
March	0.098**	2.181	0.58	0.132***	2.828	0.74
April	-0.041	-0.921	-0.23	0.04	0.870	0.22
May	-0.111**	-2.454	-0.60	-0.06	-1.279	-0.31
June	-0.160***	-3.517	-0.85	-0.166***	-3.498	-0.83
July	-0.207***	-4.52	-1.08	-0.181***	-3.848	-0.90
August	-0.338***	-7.211	-1.69	-0.285***	-5.952	-1.37
September	-0.338***	-7.232	-1.69	-0.279***	-5.83	-1.34
October	-0.318***	-6.767	-1.60	-0.278***	-5.750	-1.33
November	-0.303***	-6.250	-1.53	-0.286***	-5.757	-1.37
December	-0.256***	-5.240	-1.31	-0.290***	-5.704	-1.39
[ref: Year 12]						
Year 10 or below	0.313***	3.329	1.68	0.04	0.421	0.19
Year 11	0.274***	3.295	1.45	0.287***	3.537	1.48
[ref: no post-school qualification]						

Dependent variable: UE(t)	Females			Males		
	Coef.	Z-value	APE	Coef.	Z-value	APE
Cert. I/II	0.047	0.323	0.23	-0.193	-1.134	-0.90
Cert. III	0.158	1.118	0.82	-0.233	-1.206	-1.07
Cert. IV	-0.203	-0.954	-0.91	-0.198	-0.870	-0.92
Cert. unknown	0.294*	1.873	1.60	-0.273	-1.568	-1.23
Diploma	-0.047	-0.379	-0.22	0.064	0.431	0.33
BA or higher	0.050	0.401	0.25	-0.114	-0.777	-0.55
Y98 * Cert. I/II	-0.241	-1.172	-1.12	0.427*	1.821	2.22
Y98 * Cert. III	-0.238	-1.232	-1.11	0.194	0.732	0.92
Y98 * Cert. IV	0.344	1.232	2.00	0.612**	1.983	3.43
Y98 * Cert. unknown	-0.435	-1.371	-1.88	0.214	0.705	1.02
Y98 * Diploma	-0.088	-0.453	-0.43	0.420*	1.805	2.18
Y98 * BA or higher	-0.080	-0.466	-0.39	0.595***	2.782	3.32
[ref: FoS Arts & humanities]						
FoS Hard sciences	-0.153	-1.361	-0.73	-0.166	-1.313	-0.77
FoS Soft sciences	-0.038	-0.367	-0.19	-0.109	-0.761	-0.52
[ref: Y98 * FoS Arts & humanities]						
Y98 * FoS Hard sciences	0.068	0.387	0.35	-0.213	-1.127	-0.97
Y98 * FoS Soft sciences	-0.114	-0.746	-0.54	-0.341	-1.577	-1.48
Maths ability score	-0.025***	-2.781	-0.12	-0.028***	-2.987	-0.13
Reading ability score	-0.006	-0.754	-0.03	0.003	0.391	0.02
Planned to complete Year 12	-0.013	-0.158	-0.06	-0.016	-0.213	-0.08
[ref: Parental education less than Year 12]						
Father – Year 12	-0.081	-0.995	-0.40	0.129	1.461	0.62
Father – Trade or technical	-0.099	-1.38	-0.48	-0.008	-0.104	-0.04
Father – Degree	0.004	0.043	0.02	0.044	0.482	0.20
Father – Education missing	0.121	0.845	0.64	0.483**	2.306	2.65
Mother – Year 12	0.117*	1.686	0.59	-0.031	-0.417	-0.15
Mother – Trade or technical	-0.077	-0.872	-0.36	-0.113	-1.078	-0.53
Mother – Degree	0.100	1.239	0.50	-0.006	-0.071	-0.03
Mother – Education missing	0.030	0.181	0.14	-0.311	-1.452	-1.36
[ref: Australian born]						
Overseas born − mainly English-speaking country	0.350**	2.342	1.98	0.019	0.120	0.09
Overseas born – non-English-speaking country	0.139	1.243	0.73	0.098	0.802	0.48
[ref: Metropolitan]						
Regional	0.030	0.506	0.15	0.048	0.715	0.23
Rural or remote	0.063	0.948	0.32	0.078	1.068	0.37
Indigenous	0.165	1.002	0.87	-0.017	-0.094	-0.08
Lives with parents (t-1)	-0.005**	-2.280	-0.02	-0.002	-1.022	-0.01
Has child(ren)	0.662***	9.285	4.15	0.531***	5.447	3.12
Child info missing	-0.084	-1.362	-0.39	-0.214***	-3.118	-0.94
Married/de facto	0.000	-0.010	0.00	-0.188***	-3.637	-0.85
[Means of time-varying variables]						
Mean (lives with parents)	-0.057	-1.258		-0.017	-0.574	
Mean (Has child[ren])	0.125	0.966		-0.108	-0.429	
Mean (Child info missing)	0.051	0.276		0.000	0.002	
Mean (Married/de facto)	-0.150*	-1.760		-0.154	-1.240	

Dependent variable: UE(t)	Females			Males		
	Coef.	Z-value	APE	Coef.	Z-value	APE
UE(t = 1) (initial condition)	2.250***	22.615	24.43	2.464***	22.092	26.85
Y98 * UE(t = 1) (initial condition)	0.083	0.669	0.42	-0.071	-0.517	-0.33
LSAY98 observation (Y98)	0.511***	5.803	2.57	0.285***	3.349	1.35
Constant	-2.460***	-15.320		-2.354***	-14.666	
/lnsig2u	0.252***	4.613		0.350***	6.327	
rho	0.563	41.910		0.587	43.730	
Number of obs	141 882			139 013		
Number of groups	5 126			4 526		
Wald chi2(55)	3 511.51			3 587.75		
Prob > chi2	0.000			0.000		
Log likelihood	-13 029.279			-12 631.667		

Note: The *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

The term 'lnsig2u' denotes the natural log of the variance. 'rho' is given as sig2u/(sig2u+1) and gives the proportion of the total variance contributed by the panel-level variance component.

Table A3 Results from (random effect) probits on the probability of being unemployed—six-month lags

Dependent variable: UE(t)	Females			Males		
	Coef.	Z-value	APE	Coef.	Z-value	APE
UE(t-6)	0.463***	5.844	2.71	0.302***	3.707	1.59
UE(t-6) * Y98	-0.336***	-3.444	-1.49	-0.180*	-1.858	-0.80
[ref: UE(t-6) * Year 12]						
UE(t-6) * Year 10 or below	-0.167	-1.224	-0.79	-0.002	-0.015	-0.01
UE(t-6) * Year 11	-0.280*	-1.865	-1.27	-0.143	-1.185	-0.65
[ref: UE(t-6) * no post-school qualification]						
UE(t-6) * Cert. I/II	-0.904***	-4.949	-3.33	-0.206	-0.925	-0.91
UE(t-6) * Cert. III/IV	-0.400**	-2.444	-1.75	-0.631***	-3.197	-2.41
UE(t-6) * Cert. unknown	-0.296	-1.575	-1.34	-0.686***	-3.174	-2.57
UE(t-6) * Diploma	-0.096	-0.534	-0.46	-0.010	-0.074	-0.05
UE(t-6) * BA or higher	-0.532***	-2.938	-2.22	-0.017	-0.118	-0.08
[ref: UE(t-6) * Y98 * Year 12]						
UE(t-6) * Y98 * Year 10 or below	0.360**	2.092	2.05	0.037	0.218	0.18
UE(t-6) * Y98 * Year 11	0.521***	2.879	3.14	0.199	1.262	1.02
[ref: UE(t-6) * Y98 * no post-school qualification]						
UE(t-6) * Y98 * Cert. I/II	1.090***	4.757	8.06	0.546**	2.014	3.16
UE(t-6) * Y98 * Cert. III/IV	0.526**	2.563	3.17	0.716***	2.653	4.40
UE(t-6) * Y98 * Cert. unknown	0.920**	2.575	6.40	0.420	1.171	2.32
UE(t-6) * Y98 * Diploma	0.168	0.598	0.89	0.324	1.412	1.73
UE(t-6) * Y98 * BA or higher	0.159	0.628	0.84	-0.634**	-2.395	-2.41
[ref: UE(t-6) * FoS Arts & humanities]						
UE(t-6) * FoS Hard sciences	0.389***	2.740	2.23	0.099	0.723	0.49
UE(t-6) * FoS Soft sciences	-0.016	-0.113	-0.08	0.342**	2.279	1.84
[ref: UE(t-6) * Y98 * FoS Arts & humanities]						
UE(t-6) * Y98 * FoS Hard sciences	-0.663***	-3.080	-2.62	-0.274	-1.317	-1.18
UE(t-6) * Y98 * FoS Soft sciences	-0.040	-0.199	-0.20	-0.491**	-2.033	-1.97
[ref: 2001]						
2002	-0.097**	-1.992	-0.70	-0.165***	-3.354	-1.22
2003	-0.317***	-6.248	-2.10	-0.424***	-8.381	-2.89
2004	-0.598***	-11.263	-3.60	-0.851***	-15.898	-5.04
2005	-0.811***	-14.57	-4.55	-1.057***	-19.054	-5.86
2006	-1.000***	-17.142	-5.27	-1.263***	-21.778	-6.56
[ref: January]						
February	0.017	0.375	0.10	-0.009	-0.185	-0.05
March	0.101**	2.251	0.58	0.133***	2.839	0.73
April	-0.021	-0.456	-0.11	0.060	1.280	0.32
May	-0.071	-1.548	-0.39	-0.029	-0.617	-0.15
June	-0.083*	-1.806	-0.45	-0.081*	-1.69	-0.41
July	-0.140***	-3.104	-0.74	-0.110**	-2.352	-0.55
August	-0.285***	-6.162	-1.44	-0.232***	-4.878	-1.12
September	-0.299***	-6.461	-1.50	-0.256***	-5.367	-1.22
October	-0.289***	-6.2	-1.45	-0.261***	-5.423	-1.24
November	-0.314***	-6.519	-1.56	-0.295***	-5.948	-1.39
December	-0.281***	-5.77	-1.42	-0.305***	-5.996	-1.43
[ref: Year 12]						
Year 10 or below	0.380***	3.718	2.08	0.048	0.457	0.22
Year 11	0.292***	3.232	1.55	0.321***	3.583	1.65
[ref: No post-school qualification]						

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Dependent variable: UE(t)	Females			Males		
	Coef.	Z-value	APE	Coef.	Z-value	APE
Cert. I/II	0.123	0.773	0.62	-0.233	-1.229	-1.08
Cert. III	0.229	1.493	1.20	-0.241	-1.131	-1.12
Cert. IV	-0.135	-0.587	-0.62	-0.288	-1.107	-1.31
Cert. unknown	0.340**	1.987	1.85	-0.311	-1.603	-1.41
Diploma	-0.040	-0.295	-0.19	0.032	0.193	0.16
BA or higher	0.083	0.599	0.41	-0.100	-0.610	-0.49
Y98 * Cert. I/II	-0.298	-1.332	-1.39	0.481*	1.844	2.51
Y98 * Cert. III	-0.325	-1.546	-1.50	0.223	0.761	1.06
Y98 * Cert. IV	0.297	0.982	1.71	0.777**	2.244	4.52
Y98 * Cert. unknown	-0.487	-1.423	-2.12	0.235	0.693	1.12
Y98 * Diploma	-0.116	-0.548	-0.57	0.528**	2.047	2.81
Y98 * BA or higher	-0.119	-0.636	-0.59	0.629***	2.642	3.47
[ref: FoS Arts & humanities]						
FoS Hard sciences	-0.207*	-1.681	-0.99	-0.179	-1.264	-0.83
FoS Soft sciences	-0.048	-0.435	-0.24	-0.112	-0.698	-0.53
[ref: Y98 * FoS Arts & humanities]						
Y98 * FoS Hard sciences	0.168	0.874	0.89	-0.216	-1.023	-0.99
Y98 * FoS Soft sciences	-0.107	-0.643	-0.51	-0.365	-1.521	-1.58
Maths ability score	-0.028***	-2.909	-0.14	-0.030***	-2.932	-0.14
Reading ability score	-0.008	-0.833	-0.04	0.003	0.333	0.02
Planned to complete Year 12	0.000	-0.002	0.00	-0.009	-0.108	-0.04
[ref: Parental education less than Year 12]						
Father – Year 12	-0.084	-0.942	-0.42	0.135	1.381	0.64
Father – Trade or technical	-0.113	-1.45	-0.55	-0.015	-0.174	-0.07
Father – Degree	0.007	0.073	0.03	0.055	0.539	0.25
Father – Education missing	0.143	0.918	0.77	0.535**	2.296	2.94
Mother – Year 12	0.131*	1.737	0.67	-0.023	-0.279	-0.11
Mother – Trade or technical	-0.092	-0.945	-0.43	-0.121	-1.046	-0.57
Mother – Degree	0.113	1.280	0.57	-0.016	-0.154	-0.08
Mother – Education missing	0.039	0.218	0.19	-0.351	-1.474	-1.53
[ref: Australian born]						
Overseas born − mainly English-speaking country	0.383**	2.348	2.17	0.038	0.219	0.18
Overseas born – non-English-speaking country	0.177	1.445	0.93	0.102	0.742	0.50
[ref: Metropolitan]						
Regional	0.037	0.564	0.18	0.062	0.834	0.29
Rural or remote	0.078	1.073	0.39	0.095	1.182	0.46
Indigenous	0.204	1.133	1.09	-0.016	-0.077	-0.07
Lives with parents (t-1)	-0.006***	-2.976	-0.03	-0.003	-1.630	-0.01
Has child(ren)	0.723***	10.158	4.57	0.626***	6.353	3.72
Child info missing	-0.063	-1.025	-0.30	-0.228***	-3.278	-1.00
Married/de facto	-0.013	-0.344	-0.07	-0.210***	-4.033	-0.94
[Means of time-varying variables]						
Mean (lives with parents)	-0.064	-1.283		-0.016	-0.488	
Mean (Has child[ren])	0.127	0.919		-0.133	-0.482	
Mean (Child info missing)	0.014	0.068		-0.012	-0.055	
Mean (Married/de facto)	-0.155*	-1.684		-0.167	-1.215	

Dependent variable: UE(t)	Females			Males		
	Coef.	Z-value	APE	Coef.	Z-value	APE
UE(t = 1) (initial condition)	2.501***	22.984	27.43	2.727***	21.863	29.37
Y98 * UE(t = 1) (initial condition)	0.174	1.270	0.92	0.060	0.384	0.29
LSAY98 observation (Y98)	0.539***	5.615	2.73	0.272***	2.916	1.30
Constant	-2.523***	-14.391		-2.415***	-13.59	
/lnsig2u	0.489***	9.632		0.623***	11.941	
rho	0.620	51.821		0.651	54.915	
Number of obs	139 322			136 625		
Number of groups	5 122			4 524		
Wald chi2(55)	2 204.39			2 355.67		
Prob > chi2	0.000			0.000		
Log likelihood	-13 264.350			-12 779.220		

Note: The *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

The term '*lnsig2u*'denotes the natural log of the variance. '*rho*' is given as *sig2u/(sig2u+1)* and gives the proportion of the total variance contributed by the panel-level variance component.

Table A4   Results from (random effect) probits on the probability of being unemployed—12-months lag

Dependent variable: UE(t)	Females			Males		
	Coef.	Z-value	APE	Coef.	Z-value	APE
UE(t-12)	-0.056	-0.569	-0.27	-0.192**	-1.974	-0.83
UE(t-12) * Y98	-0.274**	-2.323	-1.24	0.148	1.314	0.71
[ref: UE(t-12) * Year 12]						
UE(t-12) * Year 10 or below	-0.012	-0.079	-0.06	0.185	1.226	0.90
UE(t-12) * Year 11	-0.498**	-2.487	-2.07	0.250*	1.731	1.25
[ref: UE(t-12) * no post-school qualification]						
UE(t-12) * Cert. I/II	-0.211	-1.081	-0.97	-0.236	-0.932	-1.00
UE(t-12) * Cert. III/IV	0.297	1.567	1.63	0.116	0.574	0.55
UE(t-12) * Cert. unknown	-0.246	-1.105	-1.12	-0.421	-1.605	-1.67
UE(t-12) * Diploma	-0.468**	-2.145	-1.97	0.101	0.615	0.48
UE(t-12) * BA or higher	-0.005	-0.022	-0.02	-0.104	-0.646	-0.46
[ref: UE(t-12) * Y98 * Year 12]						
UE(t-12) * Y98 * Year 10 or below	0.131	0.677	0.68	-0.263	-1.380	-1.10
UE(t-12) * Y98 * Year 11	0.612***	2.643	3.75	-0.310*	-1.694	-1.28
[ref: UE(t-12) * Y98 * no post-school qualification]						
UE(t-12) * Y98 * Cert. I/II	-0.014	-0.054	-0.07	0.215	0.688	1.06
UE(t-12) * Y98 * Cert. III/IV	-0.247	-1.057	-1.12	0.260	0.896	1.31
UE(t-12) * Y98 * Cert. unknown	0.449	1.006	2.60	0.656*	1.646	3.79
UE(t-12) * Y98 * Diploma	0.828**	2.497	5.48	-0.040	-0.153	-0.18
UE(t-12) * Y98 * BA or higher	-0.084	-0.274	-0.40	-0.235	-0.763	-0.99
[ref: UE(t-12) * FoS Arts & humanities]						
UE(t-12) * FoS Hard sciences	0.305*	1.848	1.68	0.154	1.019	0.74
UE(t-12) * FoS Soft sciences	-0.082	-0.489	-0.39	0.127	0.735	0.61
[ref: UE(t-12) * Y98 * FoS Arts & humanities]						
UE(t-12) * Y98 * FoS Hard sciences	-0.513**	-1.994	-2.12	-0.416*	-1.781	-1.65
UE(t-12) * Y98 * FoS Soft sciences	-0.324	-1.361	-1.43	-0.314	-1.132	-1.29
[ref: 2002]						
2003	-0.207***	-6.668	-1.34	-0.249***	-8.193	-1.61
2004	-0.513***	-14.734	-3.00	-0.713***	-20.431	-3.94
2005	-0.752***	-19.489	-4.07	-0.941***	-24.976	-4.83
2006	-0.943***	-22.506	-4.79	-1.159***	-28.307	-5.55
[ref: January]						
February	0.019	0.402	0.10	-0.004	-0.073	-0.02
March	0.114**	2.516	0.65	0.141***	2.999	0.74
April	-0.012	-0.255	-0.06	0.070	1.481	0.35
May	-0.067	-1.437	-0.35	-0.025	-0.517	-0.12
June	-0.078*	-1.692	-0.41	-0.081*	-1.696	-0.39
July	-0.113**	-2.438	-0.59	-0.087*	-1.823	-0.42
August	-0.272***	-5.703	-1.34	-0.228***	-4.667	-1.04
September	-0.283***	-5.938	-1.39	-0.259***	-5.268	-1.17
October	-0.283***	-5.862	-1.39	-0.274***	-5.494	-1.24
November	-0.323***	-6.420	-1.57	-0.284***	-5.528	-1.27
December	-0.327***	-6.337	-1.58	-0.310***	-5.842	-1.38
[ref: Year 12]						
Year 10 or below	0.356***	3.226	1.91	0.055	0.507	0.25
Year 11	0.308***	3.192	1.62	0.273***	2.892	1.33
[ref: No post-school qualification]						
Cert. I/II	-0.064	-0.354	-0.31	-0.258	-1.268	-1.14

Dependent variable: UE(t)	Females			Males		
	Coef.	Z-value	APE	Coef.	Z-value	APE
Cert. III	0.126	0.744	0.65	-0.303	-1.326	-1.32
Cert. IV	-0.219	-0.878	-1.00	-0.341	-1.224	-1.47
Cert. unknown	0.351*	1.901	1.96	-0.351*	-1.699	-1.50
Diploma	-0.025	-0.172	-0.12	0.053	0.309	0.26
BA or higher	-0.022	-0.149	-0.11	-0.059	-0.348	-0.28
Y98 * Cert. I/II	-0.100	-0.410	-0.49	0.535**	1.963	2.74
Y98 * Cert. III	-0.204	-0.903	-0.96	0.239	0.780	1.10
Y98 * Cert. IV	0.392	1.212	2.27	0.802**	2.211	4.52
Y98 * Cert. unknown	-0.434	-1.208	-1.88	0.221	0.631	1.01
Y98 * Diploma	-0.187	-0.832	-0.89	0.531**	2.015	2.72
Y98 * BA or higher	-0.071	-0.354	-0.35	0.551**	2.262	2.84
[ref: FoS Arts & humanities]						
FoS Hard sciences	-0.177	-1.336	-0.84	-0.197	-1.331	-0.88
FoS Soft sciences	-0.022	-0.181	-0.11	-0.099	-0.596	-0.46
[ref: Y98 * FoS Arts & humanities]						
Y98 * FoS Hard sciences	0.148	0.724	0.77	-0.182	-0.839	-0.81
Y98 * FoS Soft sciences	-0.109	-0.617	-0.52	-0.380	-1.544	-1.58
Maths ability score	-0.028***	-2.691	-0.14	-0.033***	-3.120	-0.15
Reading ability score	-0.010	-1.025	-0.05	0.007	0.700	0.03
Planned to complete Year 12	0.028	0.295	0.14	-0.001	-0.014	-0.01
[ref: Parental education less than Year 12]						
Father – Year 12	-0.076	-0.793	-0.37	0.138	1.357	0.63
Father – Trade or technical	-0.134	-1.605	-0.64	-0.002	-0.026	-0.01
Father – Degree	0.007	0.066	0.03	0.073	0.697	0.33
Father – Education missing	0.175	1.063	0.94	0.510**	2.112	2.67
Mother – Year 12	0.166**	2.057	0.84	-0.011	-0.135	-0.05
Mother – Trade or technical	-0.073	-0.704	-0.34	-0.141	-1.185	-0.64
Mother – Degree	0.136	1.451	0.68	-0.051	-0.490	-0.24
Mother – Education missing	0.045	0.236	0.22	-0.375	-1.517	-1.57
[ref: Australian born]						
Overseas born − mainly English-speaking country	0.385**	2.208	2.16	-0.079	-0.423	-0.35
Overseas born – non-English-speaking country	0.188	1.451	0.98	0.168	1.191	0.81
[ref: Metropolitan]						
Regional	0.017	0.237	0.08	0.113	1.475	0.52
Rural or remote	0.055	0.710	0.28	0.146*	1.754	0.68
Indigenous	0.251	1.309	1.35	0.002	0.009	0.01
Lives with parents (t-1)	-0.008***	-3.985	-0.04	-0.003	-1.461	-0.01
Has child(ren)	0.798***	10.566	5.09	0.671***	6.308	3.91
Child info missing	-0.094	-1.456	-0.43	-0.227***	-3.074	-0.96
Married/de facto	-0.024	-0.592	-0.12	-0.237***	-4.362	-1.02
[Means of time-varying variables]						
Mean (lives with parents)	-0.052	-0.980		-0.019	-0.537	
Mean (Has child[ren])	0.071	0.481		-0.234	-0.808	
Mean (Child info missing)	0.025	0.116		-0.102	-0.445	
Mean (Married/de facto)	-0.180*	-1.818		-0.138	-0.971	
UE(t = 1) (initial condition)	2.485***	21.142	26.18	2.724***	20.733	27.82

Dependent variable: UE(t)	Females			Males		
	Coef.	Z-value	APE	Coef.	Z-value	APE
Y98 * UE(t = 1) (initial condition)	0.343**	2.337	1.90	0.140	0.847	0.67
LSAY98 observation (Y98)	0.490***	4.767	2.45	0.293***	3.010	1.34
Constant	-2.605***	-14.230		-2.664***	-14.670	
/lnsig2u	0.602***	11.712		0.717***	14.521	
Rho	0.646	54.981		0.672	61.724	
Number of obs	132 865			130 557		
Number of groups	5 019			4 437		
Wald chi2(80)	1 974.54			2 216.58		
Prob > chi2	0.000			0.000		
Log likelihood	-12 480.107			-11 970.411		

Note: The *, **, and *** denote statistical significance at the 10%, 5% and 1% level, respectively.

The term '*lnsig2u*' denotes the natural log of the variance. '*rho*' is given as *sig2u/(sig2u+1)* and gives the proportion of the total variance contributed by the panel-level variance component.

Table A5   Overview of scarring effects by education/qualification level for different time lags—females

	Females			
	1 month	3 months	6 months	12 months
Unemployment lagged 'x months'	60.54***	8.74***	2.71***	-0.27
* Y98	-0.87***	-1.70***	-1.49***	-1.24**
[ref: * Year 12]				
* Year 10 or below	0.49	0.68	-0.79	-0.06
* Year 11	0.33	-1.46***	-1.27*	-2.07**
[ref: * no post-school qualification]				
* Cert. I/II	-0.82**	-1.43**	-3.33***	-0.97
* Cert. III/IV	-0.46	-0.39	-1.75**	1.63
* Cert. unknown	-1.20***	-1.10	-1.34	-1.12
* Diploma	-0.46	-1.30*	-0.46	-1.97**
* BA or higher	-0.43	-1.03	-2.22***	-0.02
[ref: * Y98 * Year 12]				
* Y98 * Year 10 or below	0.20	1.84**	2.05**	0.68
* Y98 * Year 11	0.19	3.57***	3.14***	3.75***
[ref: * Y98 * no post-school qualification]				
* Y98 * Cert. I/II	2.42***	3.30***	8.06***	-0.07
* Y98 * Cert. III/IV	0.50	-0.26	3.17**	-1.12
* Y98 * Cert. unknown	2.38	2.52	6.40**	2.60
* Y98 * Diploma	1.15	-0.17	0.89	5.48**
* Y98 * BA or higher	1.07	-1.16	0.84	-0.40
[ref: * FoS Arts & humanities]				
* FoS Hard sciences	0.52	0.19	2.23***	1.68*
* FoS Soft sciences	0.14	-0.17	-0.08	-0.39
[ref: * Y98 * FoS Arts & humanities]				
* Y98 * FoS Hard sciences	0.00	1.13	-2.62***	-2.12**
* Y98 * FoS Soft sciences	0.08	1.60*	-0.20	-1.43

Note: The *, **, and *** denote statistical significance of the raw coefficient estimate underlying the APE at the 10%, 5% and 1% level, respectively.

Table A6 Overview of scarring effects by education/qualification level for different time lags—males

	Males			
	1 month	3 months	6 months	12 months
Unemployment lagged 'x months'	44.32***	6.29***	1.59***	-0.83**
* Y98	0.28	-0.42	-0.80*	0.71
[ref: * Year 12]				
* Year 10 or below	0.74*	1.18**	-0.01	0.90
* Year 11	0.42	-0.63	-0.65	1.25*
[ref: * no post-school qualification]				
* Cert. I/II	-0.12	-0.55	-0.91	-1.00
* Cert. III/IV	-0.97**	-1.06	-2.41***	0.55
* Cert. unknown	-0.83	-1.71**	-2.57***	-1.67
* Diploma	0.49	-0.37	-0.05	0.48
* BA or higher	-0.45	-0.19	-0.08	-0.46
[ref: * Y98 * Year 12]				
* Y98 * Year 10 or below	-1.04**	-0.97	0.18	-1.10
* Y98 * Year 11	-0.76*	0.38	1.02	-1.28*
[ref: * Y98 * no post-school qualification]				
* Y98 * Cert. I/II	1.03	1.08	3.16**	1.06
* Y98 * Cert. III/IV	2.26**	1.83	4.40***	1.31
* Y98 * Cert. unknown	3.48**	1.28	2.32	3.79*
* Y98 * Diploma	-0.13	1.23	1.73	-0.18
* Y98 * BA or higher	2.50**	-2.50***	-2.41**	-0.99
[ref: * FoS Arts & humanities]				
* FoS Hard sciences	0.29	-0.05	0.49	0.74
* FoS Soft sciences	1.27**	0.85	1.84**	0.61
[ref: * Y98 * FoS Arts & humanities]				
* Y98 * FoS Hard sciences	0.37	0.80	-1.18	-1.65*
* Y98 * FoS Soft sciences	-1.35**	-0.19	-1.97**	-1.29

Note: The *, **, and *** denote statistical significance of the raw coefficient estimate underlying the APE at the 10%, 5% and 1% level, respectively.

The point estimates of the scarring effects for tables A7 and A8 are sums of the relevant APE. For instance, the point estimate of the scarring effect for unemployment three months prior for a male or female with only Year 12, no post-school qualification, and coming from Y95 is simply the APE for the variable UE(t-3).

For an example of the most complicated point estimate, consider the point estimate for a male or female from Y98, with Year 11 and a certificate I/II. This point estimate is computed by summing the APE for six different variables: UE(t-3), UE(t-3) * Y98, UE(t-3) * Year 11, UE(t-3) * Y98 * Year 11, UE(t-3) * Certificate I/II, and UE(t-3) * Y98 * Certificate I/II.
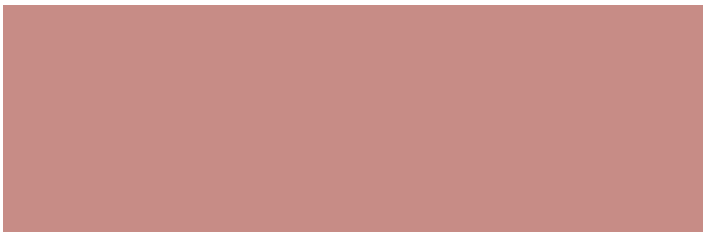
The point estimates for other combinations of school, post-school and cohort are computed similarly using the APE from the relevant tables A1 through A4.

Table A7   Point estimates of scarring effects (percentage points) by cohort for specific school and post-school levels—females

Cohort	School level	Post-school level	Lagged unemployment status			
			1 month	3 months	6 months	12 months
Y95	Year 10 or less	none	61.03	9.42	1.92	-0.33
Y95	Year 11	none	60.87	7.28	1.44	-2.34
Y95	Year 12	none	60.54	8.74	2.71	-0.27
Y95	Year 10 or less	Cert. I/II	60.21	7.99	-1.41	-1.30
Y95	Year 10 or less	Cert. III/IV	60.57	9.03	0.17	1.30
Y95	Year 10 or less	Cert. unknown	59.83	8.32	0.58	-1.45
Y95	Year 10 or less	Diploma	60.57	8.12	1.46	-2.30
Y95	Year 11	Cert. I/II	60.05	5.85	-1.89	-3.31
Y95	Year 11	Cert. III/IV	60.41	6.89	-0.31	-0.71
Y95	Year 11	Cert. unknown	59.67	6.18	0.10	-3.46
Y95	Year 11	Diploma	60.41	5.98	0.98	-4.31
Y95	Year 12	Cert. I/II	59.72	7.31	-0.62	-1.24
Y95	Year 12	Cert. III/IV	60.08	8.35	0.96	1.36
Y95	Year 12	Cert. unknown	59.34	7.64	1.37	-1.39
Y95	Year 12	Diploma	60.08	7.44	2.25	-2.24
Y95	Year 12	BA or higher	60.11	7.71	0.49	-0.29
Y98	Year 10 or less	none	60.36	9.56	2.48	-0.89
Y98	Year 11	none	60.19	9.15	3.09	0.17
Y98	Year 12	none	59.67	7.04	1.22	-1.51
Y98	Year 10 or less	Cert. I/II	61.96	11.43	7.21	-1.93
Y98	Year 10 or less	Cert. III/IV	60.40	8.91	3.90	-0.38
Y98	Year 10 or less	Cert. unknown	61.54	10.98	7.54	0.59
Y98	Year 10 or less	Diploma	61.05	8.09	2.91	2.62
Y98	Year 11	Cert. I/II	61.79	11.02	7.82	-0.87
Y98	Year 11	Cert. III/IV	60.23	8.50	4.51	0.68
Y98	Year 11	Cert. unknown	61.37	10.57	8.15	1.65
Y98	Year 11	Diploma	60.88	7.68	3.52	3.68
Y98	Year 12	Cert. I/II	61.27	8.91	5.95	-2.55
Y98	Year 12	Cert. III/IV	59.71	6.39	2.64	-1.00
Y98	Year 12	Cert. unknown	60.85	8.46	6.28	-0.03
Y98	Year 12	Diploma	60.36	5.57	1.65	2.00
Y98	Year 12	BA or higher	60.31	4.85	-0.16	-1.93

Table A8 Point estimates of scarring effects (percentage points) by cohort for specific school and post-school levels—males

Cohort	School level	Post-school level	Lagged unemployment status			
			1 month	3 months	6 months	12 months
Y95	Year 10 or less	none	45.06	7.47	1.58	0.07
Y95	Year 11	none	44.74	5.66	0.94	0.42
Y95	Year 12	none	44.32	6.29	1.59	-0.83
Y95	Year 10 or less	Cert. I/II	44.94	6.92	0.67	-0.93
Y95	Year 10 or less	Cert. III/IV	44.09	6.41	-0.83	0.62
Y95	Year 10 or less	Cert. unknown	44.23	5.76	-0.99	-1.60
Y95	Year 10 or less	Diploma	45.55	7.10	1.53	0.55
Y95	Year 11	Cert. I/II	44.62	5.11	0.03	-0.58
Y95	Year 11	Cert. III/IV	43.77	4.60	-1.47	0.97
Y95	Year 11	Cert. unknown	43.91	3.95	-1.63	-1.25
Y95	Year 11	Diploma	45.23	5.29	0.89	0.90
Y95	Year 12	Cert. I/II	44.20	5.74	0.68	-1.83
Y95	Year 12	Cert. III/IV	43.35	5.23	-0.82	-0.28
Y95	Year 12	Cert. unknown	43.49	4.58	-0.98	-2.50
Y95	Year 12	Diploma	44.81	5.92	1.54	-0.35
Y95	Year 12	BA or higher	43.87	6.10	1.51	-1.29
Y98	Year 10 or less	none	44.30	6.08	0.96	-0.32
Y98	Year 11	none	44.26	5.62	1.16	-0.15
Y98	Year 12	none	44.60	5.87	0.79	-0.12
Y98	Year 10 or less	Cert. I/II	45.21	6.61	3.21	-0.26
Y98	Year 10 or less	Cert. III/IV	45.59	6.85	2.95	1.54
Y98	Year 10 or less	Cert. unknown	46.95	5.65	0.71	1.80
Y98	Year 10 or less	Diploma	44.66	6.94	2.64	-0.02
Y98	Year 11	Cert. I/II	45.17	6.15	3.41	-0.09
Y98	Year 11	Cert. III/IV	45.55	6.39	3.15	1.71
Y98	Year 11	Cert. unknown	46.91	5.19	0.91	1.97
Y98	Year 11	Diploma	44.62	6.48	2.84	0.15
Y98	Year 12	Cert. I/II	45.51	6.40	3.04	-0.06
Y98	Year 12	Cert. III/IV	45.89	6.64	2.78	1.74
Y98	Year 12	Cert. unknown	47.25	5.44	0.54	2.00
Y98	Year 12	Diploma	44.96	6.73	2.47	0.18
Y98	Year 12	BA or higher	46.65	3.18	-1.70	-1.57

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