Annual transitions between labour market states for young Australians

MELBOURNE INSTITUTE OF APPLIED ECONOMIC AND SOCIAL RESEARCH

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AUSTRALIAN COUNCIL FOR EDUCATIONAL RESEARCH

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About the research

Annual transitions between labour market states for young Australians

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Much analysis of youth transitions focuses on the first year after education, or outcomes at a specific age. Such work looks, for example, at the effect of education on the likelihood of being employed or unemployed.

This study takes a different angle by considering the effect of education on the persistence of labour market outcomes. For example, leaving school before Year 12 may be associated with high levels of unemployment, but the question is whether such a person is less likely to remain in employment once he or she has a job, compared with people with better educational qualifications.

Specifically, this study examines the role that post-school qualifications play in the annual transitions between labour market states for young Australians and is based on the 1995 cohort of the Longitudinal Surveys of Australian Youth (LSAY). The labour states that were examined were: permanent employment; casual employment; unemployment; and not in the labour force. The effect of personality traits and ability on labour market transitions was also examined.

We know that having post-school qualifications, particularly higher-level qualifications, increases the chances of permanent employment, and the study confirms this. However, by focusing also on the occurrence of persistent labour market states, this work generates new insights. The study finds that the most persistent labour market states are casual employment for men, while for women it is being out of the labour force. Having at least a certificate IV for women or a bachelor degree or higher for men provides a buffer against undesirable labour market states, such as unemployment or being out of the labour force, becoming persistent.

Tom Karmel
Managing Director, NCVER

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Executive summary

This study uses an annual timeframe to evaluate the influence of labour market status in one period on status in the subsequent period. Understanding the role of past labour market experiences is important when it is the objective of policy-makers to increase the proportion of time spent by young Australians in desirable labour market states, such as full-time work, and reduce the time they spend in marginalised activities, such as unemployment. These concerns are heightened during lean economic times, but they never really go away. A natural question that may arise, especially in a weak labour market for youth, is whether promoting casual employment today would lead to more people being employed permanently in the future, or would simply result in more people working on a casual basis. For such a question to be answered, it is necessary to understand the role of previous labour market states and, specifically in this study, how this role differs by the level of education and qualifications obtained.

Four labour market states are considered in this study: permanent employment; casual employment; unemployment; and not being in the labour force. The analysis used differs from previous research in that it models year-on-year transitions and does not follow the more commonly used approach of taking a group of individuals at one point in time (for example, first year after leaving school) and then modelling the labour market state, say, five years later: a 'what did they do then and where are they now' approach. This study is therefore a natural complement to this previous research.

Using the 1995 cohort of the Longitudinal Surveys of Australian Youth (LSAY), this study finds that there is substantial predictive power in the previous year's labour market state when modelling the current labour market state. In fact, the previous year's state has the largest predictive power of all factors considered, including post-school qualifications.

Much of the persistence was shown to be due to an underlying process that drives labour market outcomes in all years, particularly for casual employment, in the case of men and, for women, being out of the labour market. Ignoring this process will result in their effects being passed through the previous labour market status variables, thus creating an illusion of severe persistence. Controlling for the process shows that, although persistence was reduced, previous labour market experience has a genuine impact on current labour market status.

The study shows that being in full-time permanent employment in the previous period—compared with the alternative of being out of the labour force—is, for women, associated with a 19.4 percentage point increase in the probability of being permanently employed in the next period. For men, the increase is much smaller, at 10.0 percentage points.

Much smaller effects are found for factors other than previous labour market states. In terms of the level of post-school qualifications, higher levels of education are associated with increased probabilities of being permanently employed. Although any post-school qualification is better than none, the biggest boost is provided by certificate IV and bachelor degree or better for men, and bachelor degree or higher for women. Post-school qualifications also play a greater role for women in general.

In addition to studying the effect of post-school qualifications and previous period labour market state in isolation, they are also studied concurrently. This addresses the effect of previous period labour market outcome for different levels of post-school qualifications.

When simulating being out of the labour force in the previous period, the effect on the probability of being permanently employed in the current period was found to be -5.5 percentage points for men and -14.7 percentage points for women (off the base prediction of about 85% for both men and women). But when related to the post-school qualification level, we see that this negative effect of the permanent employment probability ranges from almost no effect when combined with having a bachelor degree or higher (-0.2 percentage points for men; -4.8 percentage points for women), to a maximum of -9.6 percentage points for men (and -27.3 percentage points for women) if being out of the labour force in the previous period is compounded by having no post-school qualifications. Having a bachelor degree for men and women or a certificate IV for women is shown to provide the best buffer against being out of the labour force becoming a persistent state.

Similarly, the effect of the previous period of unemployment on the probability of being employed permanently in the current period ranged from negligible when unemployment is combined with having a bachelor degree or better, to -6.9 percentage points for men in the worst case when unemployment is combined with having no post-school qualifications, and -14.6 percentage points for women (off the base prediction of about 85% permanently employed for both genders). In other words, an event that would lead to all of Australia's youth collectively becoming unemployed would almost be completely offset, in terms of impact on next period's labour market outcome, if this event resulted in everyone's post-school qualification levels being lifted to a bachelor degree or better, or, alternatively, a certificate IV for women.[1]

Although having much smaller an impact, policies focusing on the social skills of young Australians could also improve their labour market outcomes. Lifting young Australian women's confidence to a point where they all considered themselves as being very confident would increase the proportion of young women in permanent employment by close to 1–2 percentage points (on top of a base prediction of about 85%) and about 1 percentage point extra in casual employment, while reducing unemployment and exits from the labour force.

[1] It is hard to think of an event that would result in all young people losing their job. The point made here, however, is about the comparative strength of the post-school qualification variables.

Introduction

This study examines the dynamics of the labour market, particularly in terms of flows between employment, unemployment and non-participation in the labour force. Of particular interest is the role of post-school qualifications on these labour market transitions. It thus naturally fits in with existing studies on labour market dynamics in general. What sets this study apart is that the population of interest is very narrowly defined: young Australians between the ages of roughly 22 and 25 who have completed their education and training.[2] To paraphrase, we study labour market dynamics for young Australians 'after the dust has settled'.

Objective of the research

The main objective of this project is to investigate the role of post-school qualifications on the transitions between employment and non-employment. Specifically, the following three questions are addressed:

1 What are the transitions between the following labour market states for young Australians: permanent employment, casual employment, unemployment, and not being in the labour force?

2 How persistent are the following labour market states, which can be classified as less desirable, for different levels of post-school qualifications: casual employment, unemployment, and not being in the labour force?

3 How much of any observed persistence is 'genuine' and how much of the observed persistence is 'spurious'?[3]

The policy narrative of these three research questions runs from getting a good perspective on how socioeconomic and personal characteristics are correlated with labour market choices and what role previous experiences play (question 1), to investigating the role of education and training in escaping less desirable, or bad, labour market states (question 2) and finally, the mechanism at work behind the persistence in labour market states as observed in the data.

There exists a body of research on the factors associated with particular labour market outcomes, and some of the findings from these research efforts are discussed later. However, much less is known about the process of switching back and forth between labour market states. Understanding these dynamics is crucial in order to develop initiatives that would, for instance, increase transitions out of unemployment and into permanent employment. For instance, it is a long-standing desire of successive Australian governments to minimise the amount of time that Australian youths spend in so-called marginal activities. In this context, knowing what factors are associated with being

[2] There has been an increasing awareness and emphasis on lifelong learning to ensure that individuals maintain or acquire the necessary skills to participate in society throughout their lives. Having completed education and training, as used here, means that individuals are not observed to be enrolled in study or training leading to a qualification for the duration of the period that is being modelled, that is, roughly between the ages of 22 and 25. They may take up such study further into their career/life.

[3] The concepts of genuine and spurious persistence will be discussed in more detail in the methodology section, but here it is sufficient to state that any persistence observed in the data can have two different mechanisms that would give rise to this persistence.

unemployed is not enough. It is also necessary to understand the transition from employment into unemployment and the role education and other personal characteristics play in these transitions.[4]

To frame our research objectives we first briefly discuss Australian evidence with respect to the role of education and training in young people's post-school outcomes. A broader literature on labour market dynamics does exist, but is not discussed in detail.

Previous studies

Participation in vocational education and training (VET) is an important pathway in the school-to-work transitions for many young people in Australia. VET offers opportunities for young people to develop skills that employers value. VET comprises apprenticeships and traineeships (which involve employment) and non-apprenticeship courses offered at publicly funded technical and further (TAFE) institutions and by private VET providers. VET is particularly useful for young men who did not complete Year 12, of whom just over a half completes an apprenticeship or traineeship (Curtis & McMillan 2008).

Apprentices are more likely to be male, have a low-to-medium socioeconomic background, have a parent in a technical or trade occupation, have attended a government school and have relatively lower test scores in reading and mathematics while at school. They are also likely to have a father with a trade qualification and have studied VET subjects at school (Ainley & Corrigan 2005; Curtis 2008). Trainees are more likely to be female, less likely to come from a professional background and have relatively high scores in reading and mathematics (Ainley & Corrigan 2005). Participation in non-apprenticeship VET study is generally evenly distributed across social groups, although there are some differences by VET course level (McMillan, Rothman & Wernert 2005).

In general, participation in VET tends to be associated with subsequent higher rates of full-time employment by comparison with those who undertake no post-school study. Curtis (2008) reports that, of those who had participated in a non-apprenticeship VET course, 66% of non-completers and 78% of completers were working full-time. The comparable figure for those with no post-school qualifications was 69%. For apprenticeships, the level of full-time employment is higher at around 93% for completers and 80% for non-completers. For traineeships the level of full-time employment was in the middle, at around 82% for completers and 79% for non-completers. Completion of an apprenticeship has the strongest positive impact on obtaining full-time work, which is not surprising, as apprenticeships are themselves considered a form of full-time work.

However, earlier research has suggested that full-time vocational study is not particularly beneficial in terms of labour market outcomes for at least some types of courses. Analyses of the three older cohorts from the Youth in Transition (YIT) cohorts born in 1961, 1965 and 1970, the youngest YIT cohort born in 1975, and the 1995 Longitudinal Surveys of Australian Youth Year 9 cohort have not found strong positive effects for VET on labour market outcomes (Long, McKenzie & Sturman 1996; Marks, Hillman & Beavis 2003; McMillan & Marks 2003, but see Ryan 2002). The exception is apprenticeships, which do substantially improve labour market outcomes. By contrast, according to Long (2004, pp.20–1) the benefits of TAFE qualifications are at best equivocal:

> In the year after completing their qualification, 25% of TAFE graduates were not in full-time work and were not enrolled in further study. For those TAFE graduates not studying (47% of all graduates), some form of marginal attachment or no attachment to the labour force is a more likely outcome in the short term than is full employment. (Long 2004, p.6)

These findings for vocational education—that apprenticeships improve employment prospects, but that other forms of vocational education, in general, do not substantially improve labour market

[4] To give an example, we find that obtaining a high enough level of qualification can mitigate the effect of becoming unemployed, but these findings and others will be discussed in the results section.

outcomes—is consistent with other work in Australia conducted by economists (Dockery & Norris 1996; Nevile & Saunders 1998), and is similar to international research (Ryan 2001).

More recently, similar conclusions were reached by Marks (2006) comparing full-time vocational study in the first year after leaving school with full-time work (full-time vocational study includes study at a TAFE or private institution but excludes apprentices, whom are classified as full-time workers). He found that full-time vocational study increases the chances of being in full-time study or part-time work in the fourth year after leaving school. It does not, however, increase the chances of full-time work. Full-time vocational study in the first year increases the odds of being in full-time study rather than full-time work three years later: about three times for men and twice as much for women. It also increases the odds of being in part-time rather than full-time work in the fourth year. Among men, full-time vocational study in the first year (relative to full-time work) increases the likelihood of unemployment and 'other' activities in the fourth year. The lack of positive effects for full-time study on full-time work several years later is an important finding.

It is not clear whether the differences between the conclusions of the earlier and later studies on the impact of VET reflect differences in emphasis placed on estimation results, methodological differences, the choice of comparison group, or that VET is more useful for employment outcomes now than in the 1990s.

The approach taken in this study is different from previous studies in one major respect. Most of the previous research can be characterised as taking a 'what did they do then and where are they now approach', that is, comparing outcomes for those with a VET qualification with those without a VET qualification. This is eminently sensible for studying the outcome for individuals in a given year (for example, what are the most likely labour market states for individuals, given their post-school qualifications, six years after leaving school?), but it is not very well suited to study labour market dynamics. Instead, we seek to model year-on-year transitions between labour market states and investigate the role education and training has on the probability of making these transitions.

Methodology

As individuals are interviewed annually, information is available on their labour market status on a year-by-year basis. In answering the first research question, we therefore use an annual timeframe to evaluate the influence of labour market status in one period on labour market status in the subsequent period. Note that this implies that we not only capture persistence in particular labour market states, but also all transitions from one labour market state to another. The different labour market states defined are: full-time permanent employment; part-time permanent employment; casual employment[5]; unemployment; and not being in the labour force.

Many factors influence labour market outcomes and it is common not to have indicators for some of them. When such unobserved variables are not controlled for in the analysis, their effects may be attributed erroneously to observed variables. This is what triggers the third research question, on the nature of the observed persistence of labour market states.

The labelling of genuine and spurious persistence[6] is widely used in studies of labour market dynamics and dates back to Heckman (1978). The idea, paraphrased here, is that there are potentially two mechanisms at work that will lead to the same empirical observation that people unemployed in the previous period are more likely to be unemployed in the current period, compared with individuals who were not.[7] The first mechanism, genuine persistence, captures that there is something intrinsic about unemployment that has a causal effect on the probability of being unemployed next period. It may, for instance, act to diminish the job-ready skills of an individual or give an individual a stigma that makes them less likely to be hired by employers.

The second mechanism, spurious persistence, captures the fact that there are underlying non-observed factors that drive the probability of being unemployed now and in the future. Because these underlying factors affect the probability of being unemployed in every period, it only appears that previous unemployment leads to future unemployment. In actual effect, being unemployed in both periods is driven by the same underlying (unobserved) process. This underlying process is typically labelled 'unobserved heterogeneity', indicating that different people are unique in their own special way and that this uniqueness is not observable to the researcher who is trying to model the individual's labour market dynamics.

The methods used to control for the influence of unobserved variables are described later. In controlling for these influences using a random effects specification, we make two assumptions; namely, that the unobserved variables are constant over time, and secondly, that unobserved characteristics are not related to those that are observed. As these assumptions are not only necessary but also contentious, they will also be discussed later in the methodology section. Further, in light of the assumptions, we make much of what would typically be regarded as unobserved heterogeneity explicit where possible (for example, personality traits and ability) and we limit the analysis to a reasonably short four-year window, when individuals have completed their post-school education and training, making the assumption that the unobserved heterogeneity does not vary over time more palatable.

5 Includes both full-time and part-time casual employment.

6 Persistence is often referred to as 'state dependence'.

7 Unemployment is chosen here to illustrate the point. One can readily insert any other labour market outcome instead.

The data

The data used for this report are based on responses from a nationally representative sample of the cohort of young people who were in Year 9 in 1995 (the Y95 cohort). This cohort sample forms part of the LSAY program. The young people in this sample responded to a printed questionnaire and to reading comprehension and numeracy tests conducted in their schools in 1995, to a mailed questionnaire administered in 1996, and to telephone interviews conducted annually since then.

The initial sample included 13 613 respondents from approximately 300 government, Catholic and independent schools from all Australian states and territories. In the 2001 survey, responses were received from 6876 individuals and, by 2006, 3914 individuals provided useable responses. The modal age of respondents in 2006 was 25 years. Because attrition was not uniform, sample weights were used to reflect the original population characteristics.

Defining mutually exclusive labour market states

In order to study the annual transitions between different labour market states, it is necessary to identify mutually exclusive labour market states. We use the time-consistent version of the LSAY Y95 cohort data as provided by NCVER[8] and create mutually exclusive labour market states based on this: (1) full-time permanently employed; (2) part-time permanently employed; (3) casually employed; (4) unemployed; and (5) not in the labour force.

Before describing the model used for the statistical analysis, we discuss those factors that are included as explanatory variables for the labour market states we observe.

Factors that can help explain labour market status post-qualification

Previous period labour market state

The research questions we seek to answer immediately lead to one set of factors that need to be included as explanatory variables: lagged versions of our dependent variable. Without the lags we cannot say anything about transitions between labour market states.

Details of post-school qualifications

In addition to the lagged labour market states that are included as explanatory factors, we also include details on the highest level of post-school qualifications obtained, distinguishing between: certificates I or II, certificate III, certificate IV, a certificate but at an unknown level, an advanced diploma/diploma (including associate degree), and bachelor degree or higher.

Personal characteristics of the respondent

A small number of personal characteristics of the respondent are included. They are indicators for being male, and indicators for being married or being in a de facto relationship. Those individuals not born in Australia are classified as having been born in either a mainly English-speaking country or a non-English speaking country. Furthermore, we use a categorised parental occupational class indicator, distinguishing between upper, upper-middle, lower-middle, and lower.

[8] This is the version of LSAY95 that is publicly available at the Australian Social Science Data Archive (ASSDA), subject to approval. It contains the original data elements in the previous release of the LSAY95 data, but also includes a series of derived variables in relation to labour market status, education etc. that have been made consistent over all 12 waves of the LSAY Y95.

Reading and maths ability

Students' reading and maths ability was tested in wave 1 of LSAY Y95, that is, at age 15. These are expressed as achievement scores on a scale from 0 to 20. Self-rated proficiencies are also available, but these are not used in favour of the objectively measured achievement levels.

Personality traits

Students were asked, in wave 3 (that is, at approximately age 17) to rate themselves on a 1 to 4 scale according to specific personality traits, with 1 corresponding to 'very' and 4 relating to 'not at all'. The traits distinguished were, being agreeable, open, popular, intellectual, calm, hardworking, outgoing, and confident.

The general structure of the model

The method used in the statistical analysis to model the labour market dynamics is a multinomial logit model (MNL). The inclusion of the respondents' previous labour market states makes it a dynamic multinomial logit model. The role of unobserved heterogeneity is accounted for by the inclusion of random effects. An alternative way to interpret random effects is to think of them as the constant terms in the multinomial logit model being random. The resulting model, with random alternative specific constants, is known as a form of the 'mixed multinomial logit' (MMNL) or 'random parameter logit' (RPL) model.[9] The random parameters in this case are the constants in the model. This model has considerable advantages when analysing state dependence in the presence of unobserved heterogeneity and will be briefly discussed here.

To discuss the model's structure and to illustrate why this specification is the best choice we first introduce some notation. Let the dependent variable Yit denote the labour market state at time t for individual i. Factors that influence the choice for Yit are denoted by Xit and lagged values of the dependent variable, Yit-1. The explanatory variables in Xit, as outlined previously, imply a clear direction of the association between Xit and Yit. That is, Xit influences Yit, but the reverse cannot hold. The unobserved heterogeneity—in this study captured by an individual specific random effect—is denoted by μi .

Why a logit specification?

When it comes to modelling discrete choice variables, the two main types of models are the logit and the probit models. Usually, the inclusion of lagged dependent variables creates an endogeneity problem but not so in a mixed logit framework. Train (2003, p.118) explains the issue in plain language. Using our notation, the Yit depends on Xit and the error term, εit. If that's the case, then Yit-1 depends on Xit-1 and the error term $\varepsilon it-1$. In the presence of unobserved heterogeneity the error term εit includes the unobserved heterogeneity component μi. This μi component in the error terms makes these error terms correlated over time (Train 2003, p.115). When one includes the lagged dependent variable Yt-1 on the right-hand side as an explanatory variable, it will thus violate the independence assumption between the right-hand side variables and the error term in the equation $Yt = \gamma Yt-1 + \beta Xt + \varepsilon t$. This is easy to see when one realises that Yt-1 depends on $\varepsilon t-1$, and εt and $\varepsilon t-1$ are correlated because both include μi. If a probit specification were to be used, the error structure used in the estimation would have to be corrected to account for this. Standard statistical software packages such as Stata now have routines that make this correction for binary probits that include lagged values of the dependent variable in the presence of unobserved heterogeneity.[10] However, these routines have not yet been extended to multinomial probits.

[9] Any parameter in a MMNL can be modelled as a random variable, not just the constants.

[10] Note that when it is assumed that there is no correlation over time in the error terms, e.g. in the absence of unobserved heterogeneity, including lagged dependent variables Y_{t-1} does not pose a problem.

Train (2003, p.150) explains why, choosing a mixed logit set-up, including lagged dependent variables as explanatory variables on the right-hand side, does not pose a problem in the presence of unobserved heterogeneity, unlike the case of a probit specification. The crux of it is that, conditional on the unobserved heterogeneity μi, the estimation boils down to estimating a standard multinomial logit model—with a single complication: the unobserved heterogeneity μi, on which it was conditioned, needs to be 'integrated out'. Fortunately, this can be done using standard numerical simulation, making the mixed logit approach (in our case multinomial mixed logit due to a multiple of choices) an ideal candidate to model state dependence in the presence of unobserved heterogeneity. In the next subsections we provide more detail on how the estimation works.

Unobserved heterogeneity, identification and estimation

Using our notation we briefly outline how unobserved characteristics enter the model, how the model is identified, and how it is estimated. Let the probability that an individual i chooses a particular labour market state j in period t, conditional on the unobserved random effect μi, be denoted by

$$\text{Prob}(Y_{it} = j \mid \mu_i) = \frac{\exp\left(\beta_j X_{it} + \gamma_j Y_{it-1} + \mu_i\right)}{\sum_{m=1}^{J} \exp\left(\beta_m X_{it} + \gamma_m Y_{it-1} + \mu_i\right)}.$$

This is the familiar form for the probability in a standard multinomial logit model, except it now includes Yit-1 and the unobserved heterogeneity terms, in addition to the standard Xit. There is only one complication that we need to clarify in order to match the tables with parameter estimates to the model as outlined here. The previous period labour market status (that is, Y as an explanatory variable) can take on the values of permanent full-time employment, permanent part-time employment, casual employment, unemployment, and not in the labour force. However, we combine full-time and part-time permanent employment into a single 'permanent employment' outcome for Yit (that is, Y as the dependent variable) because each extra choice outcome will greatly complicate the analysis, whereas an extra explanatory variable only has a relatively modest impact by comparison.[11] Also, and only in the case of women, the previous period labour market status (that is, Y as an explanatory variable) can take on the values of permanent full-time employment, permanent part-time or casual employment, unemployment, and not in the labour force. That is, in the case of women, we combine casual and part-time permanent employment into a single state. The more detailed specification was not supported by the data.

The probability that we observe an individual's history to be Yi = {Yi1, Yi2, Yi3,…,YiT}, given unobserved heterogeneity μi is

$$\text{Prob}(Y_i \mid \mu_i) = \prod_{t=2}^{T} \prod_{j=1}^{J} \text{Prob}(Y_{it} = j \mid \mu_i) * I(Y_{it} = j)$$

where I(·) denotes the indicator function and T is the end of our data window. Specifically, the number of choices in our model (J) is four. The number of time periods (T) is five. These five years are the last five years in the LSAY Y95 data.[12] In a final step, the unobserved heterogeneity μi needs to be integrated out of the above equation to get the unconditional probability Prob(Yi). We do so numerically by taking random draws from the distribution for μi, evaluate Prob(Yi | μi) for each of these draws (which, with the drawn μi given, is a standard MNL probability), and then average over those to get Prôb(Yi).

[11] For instance, in a model with four choices and 25 explanatory variables, one needs to estimate (4-1)*25 = 75 parameters (one of the choices needs to be normalised to zero as in any multinomial logit). By introducing an extra choice the number of parameters to be estimated is increased by another 25, to 100. An extra explanatory variable increases the number of parameters to be estimated by only three, to 78.

[12] Due to the inclusion of the labour market state in the previous period as an explanatory variable we lose one year (2002). Hence the period over which we model labour market dynamics is four years, corresponding to waves 9 to 12, when the respondents were approximately 22 to 25, spanning the calendar years 2003 to 2006.

The model is thus estimated by simulated maximum likelihood with the pseudo log-likelihood to be maximised, defined as

$$\text{Pseudo LL} = \sum_i \text{Prôb}(Y_i).$$

The unobserved random effects are assumed to be multivariate normal, and correlated.[13] Further, the random effects also assume two more conditions that were highlighted in the discussion of the research objectives earlier, namely (1) that the unobserved heterogeneity is constant over time, and (2) that these unobserved characteristics are not related to those that are observed. It is important to spell these assumptions out, as the validity of the results depends on them.

Unfortunately, these two assumptions are inevitable when including random effects. It is important to realise that they are assumptions that cannot be directly tested. Indeed, if the variables are not observed, it cannot be asserted that there is no relationship—it has to be assumed. The second assumption, that the unobservables are uncorrelated with the observed explanatory variables, is the most contentious, even in the literature. It is important however to not over-dramatise the issue. Even in straightforward OLS regressions the assumption that the error is uncorrelated with the X variables is assumed to hold. Because of assumption (2), when possible, researchers tend to prefer a fixed effects specification over a random effects specification. Unfortunately, available standard software only has the capacity to estimate fixed-effects panel data models if the dependent variable is continuous or dichotomous, but not discrete multinomial.

The first assumption, that unobserved heterogeneity is stable over time, is really inescapable and on a par with the assumption that economic agents behave rationally. If it were not, even fixed effects approaches would break down.

Discussing these assumptions may paint a somewhat sombre picture, but in reality we explicitly account for two factors that in most typical studies are unobserved (and hence would be part of the unobserved heterogeneity): personality and ability. Furthermore, we model a relatively short four-year window in the post-qualification period, where it is more reasonable to expect unobserved heterogeneity to be stable (recall that the assumption is that the unobserved heterogeneity terms are time-independent).

The initial conditions problem

Common to studies of labour market dynamics is the so-called initial condition problem. The initial condition problem arises when lagged dependent variables are included and the data observation window starts (much) later than the first opportunity to observe the labour market state of interest. Because current choices depend on lagged choices, it follows that the first choice we observe depends on lagged choices also. However, those lagged choices are typically not observed for the first observation in (nationally representative) longitudinal data sets, therefore creating a bias in the estimates. One possible approach to solve the initial conditions problems is based on a suggestion by Wooldridge (2005). In the Wooldridge approach, the relationship between Yit and μi is accounted for by modelling the distribution of μi given Yi1 (that is, the labour market state in the initial period). The assumption in Wooldridge's approach is that the distribution of the individual specific effects conditional on the exogenous individual characteristics is correctly specified.[14] Although other approaches to deal with the problem of initial conditions are available (Heckman 1981; Orme 2001), Monte Carlo simulations reported in Arulampalam and Stewart (2009) suggest

[13] Other assumptions are possible, but normally distributed random effects are most commonly used. Letting the random effects be correlated breaks the so-called Independence of Irrelevant Alternatives (IIA) assumption, a rigidity that in the past has traditionally led to multinomial probit models being preferred over multinomial logit specifications.

[14] As outlined in the previous discussion on unobserved heterogeneity, we assume these to be normally distributed.

that all three estimators display similar results and perform satisfactorily. We are, therefore, satisfied that our chosen estimation strategy is sensible. Just to clarify, in our specification the initial condition is the labour market state in 2002 (wave 8), on which we condition. The labour market states that are modelled are those for 2003 to 2006 (waves 9 to 12).

Results

In this section we discuss the results obtained from estimating the multinomial logit model as outlined earlier. We report two types of results. The first set of results consists of the parameter estimates of the model. These show the statistical significance of the various factors described in the methodology section, such as previous labour market state, that were included in the model as explanatory variables. The estimates in themselves, however, are not very informative. For starters, the multinomial logit model requires a normalisation, for identification, that sets all parameter estimates for the normalised outcome to zero. The choice of the normalised outcome is arbitrary, but it does affect the appearance of the table with the parameter estimates. Parameter estimates are only obtained for the three remaining outcomes. (We use 'not in the labour force' as the normalised outcome.) Similarly, in the set of explanatory variables we need to choose certain characteristics as reference categories in order to avoid perfect multi-collinearity. Again, this only affects the appearance of the table with parameter estimates, and is otherwise inconsequential.

To overcome the interpretation issue of raw multinomial logit parameter model estimates we instead discuss a different set of results. These results consist of simulations based on the parameter estimates. The simulations have a very natural interpretation and show what we predict to happen to people's labour market status if we were to give them a different (chosen) set of characteristics. They also show the impact on all labour market outcomes (that is, not affected by a normalisation), as well as the impacts of all factors (again, no normalisation issue here). We will discuss how these simulations work in practice in more detail. The raw parameter estimates are reported for the sample as a whole and for males and females separately in the appendix.

Results from scenario analyses

Introduction

One way to address the economic importance of the variables is to perform scenario analyses. The process is rather straightforward and will be briefly discussed using the indicators for country of birth and parents' occupation class as examples. The scenarios for the other variables all follow the same process.

After estimating the model, the parameter estimates are preserved. Using the actual observed values for the variables in the data, the probability of being in each of the four labour market states is predicted for each of the individuals in the sample. These are then averaged over all individuals and form the base predictions with which the scenarios are compared. The scenarios operate as follows: for each individual the indicator for being born overseas is set equal to 0. This altered data set is then used to again predict the probability of being in each of the four labour market states for each of the respondents. These are averaged over all respondents and can then be readily compared with the base predictions. A second scenario is repeated, but this time, setting the indicator for being

born overseas equal to 1 for all respondents, resulting in a second distribution to be compared with the base prediction.[15]

For the variables that indicate the parents' occupation class, it is necessary to condition on three variables at once, because if the parents' occupation class is upper-middle, it cannot simultaneously be upper, lower-middle or lower. Thus, simulating all individuals having parents' occupation class as upper-middle amounts to setting both remaining indicators for lower and lower-middle to zero; simulating having parents' occupation class as lower amounts to setting that variable to 1, while setting the parents' occupation class as lower-middle and upper-middle equal to 0, and so on.

In tables 1 to 4 we present the results (for males and females, separately) of the 'what if' scenarios, categorised by the effects of personal characteristics (including ability), personality, post-school qualifications and previous period labour market state, and finally post-school qualifications and previous labour market state combined. The latter addresses the role of post-school qualifications on the persistence of labour market states. In each of the tables the top line displays the base predictions. Each of the scenarios is expressed as deviations from these base predictions in percentage points. Because the states are mutually exclusive, and each individual has to be in exactly one of them, the percentage point changes in each scenario have to sum to zero. So, for example, if being married or in a de facto relationship increases the probability of being observed in permanent employment, then this needs to be offset by an equally reduced probability of being in any of the other three labour market states. How much each of these labour market states is affected in turn is an empirical matter. That is, not all are necessarily affected in equal proportion. We report results for males and females separately, following the same grouping as outlined earlier in the discussion of the factors that can help explain labour market status post-qualification.

The role of personal characteristics

In table 1 the results from the scenario analyses for the personal characteristics are displayed for males and females separately. They relate to gender, country of birth, parental occupational status, partner status, and achievement scores for reading and maths. There are too many numbers for them to be discussed in detail, so we highlight the overall impression of them. One thing that stands out is that all effects are relatively small. The largest percentage point change to predicted probabilities is only in the order of 1–3 percentage points, which is achieved by the scenarios that simulate respondents being married or in a de facto relationship. Being partnered, it seems, increases the proportion of respondents working casually or being out of the labour force at the expense of being employed permanently, but only for women. For men, the reverse holds true, that is, being partnered increases the proportion of respondents working permanently (or casually) at the expense of being out of the labour force. Furthermore, we also note that the magnitudes of the effects do not change much between the specification with and without controls for unobserved heterogeneity.

[15] This is why they are called simulations, as we are effectively comparing the predicted probabilities for the actual data with the predicted probabilities when everyone would be Australian-born and when everyone would be foreign-born. However, this is precisely what would be wanted if one is interested in the role of country of birth on the predicted probabilities of being in a particular labour market state.

Table 1a Males: Results from what-if scenarios based on parameter estimates—Personal characteristics (%)

Labour market state (dependent variable)	Specification without random effects				Specification with (correlated) random effects			
	Permanent	Casual	Unemployed	Not in labour force	Permanent	Casual	Unemployed	Not in labour force
Predicted labour market states at observed data values	86.67	8.58	2.36	2.40	87.26	7.89	2.65	2.20
Changes to these base predictions if everyone were:								
Born in Australia	0.02	-0.07	0.06	0.00	0.05	-0.10	0.05	-0.01
Born overseas	-0.40	0.80	-0.41	0.00	-0.80	1.16	-0.42	0.06
Parents' occupation class – upper	-1.55	-1.25	1.06	1.74	-1.32	-1.27	1.14	1.45
Parents' occupation class – upper-middle	-0.45	1.15	-0.05	-0.65	-0.96	1.48	0.05	-0.57
Parents' occupation class – lower-middle	0.00	0.67	-0.31	-0.36	-0.17	0.85	-0.37	-0.31
Parents' occupation class – lower	1.62	-1.89	0.04	0.23	2.07	-2.31	-0.03	0.27
Not cohabitating	-0.44	-0.15	0.28	0.31	-0.52	-0.11	0.34	0.30
Married or de facto	1.72	0.36	-1.03	-1.05	1.84	0.26	-1.18	-0.92
Ability score reading 10 (on scale of 0–20)	0.07	-0.34	-0.03	0.29	-0.05	-0.28	0.01	0.32
Ability score reading 15 (on scale of 0–20)	0.10	-0.23	-0.05	0.18	0.26	-0.38	-0.08	0.20
Ability score maths 10 (on scale of 0–20)	0.41	-0.35	0.14	-0.20	0.50	-0.44	0.12	-0.19
Ability score maths 15 (on scale of 0–20)	-0.65	0.38	0.29	-0.02	-0.76	0.51	0.30	-0.06

Source: LSAY 1995 cohort.

Table 1b Females: Results from what-if scenarios based on parameter estimates—Personal characteristics (%)

	Specification without random effects				Specification with (correlated) random effects			
Labour market state (dependent variable)	Permanent	Casual	Unemployed	Not in labour force	Permanent	Casual	Unemployed	Not in labour force
Predicted labour market states at observed data values	85.42	3.86	2.93	7.78	84.48	3.05	5.98	6.50
Changes to these base predictions if everyone were:								
Born in Australia	0.12	-0.09	-0.02	-0.01	-0.01	0.00	-0.03	0.03
Born overseas	-2.58	2.03	0.27	0.29	0.10	-0.05	0.40	-0.44
Parents' occupation class – upper	1.96	-0.31	-1.16	-0.49	2.80	-0.71	-2.21	0.12
Parents' occupation class – upper-middle	-0.24	-0.42	0.20	0.45	-0.78	-0.22	0.37	0.63
Parents' occupation class – lower-middle	0.45	0.57	-0.57	-0.45	0.96	0.48	-0.85	-0.59
Parents' occupation class – lower	-1.13	-0.43	1.10	0.46	-1.91	-0.33	1.81	0.43
Not cohabitating	2.32	-0.82	0.65	-2.15	1.27	-0.37	1.11	-2.01
Married or de facto	-2.47	1.14	-0.67	2.00	-1.17	0.48	-1.21	1.90
Ability score reading 10 (on scale of 0–20)	-0.16	0.27	0.43	-0.54	0.10	0.02	0.76	-0.88
Ability score reading 15 (on scale of 0–20)	-0.21	0.19	-0.50	0.52	-0.31	0.30	-0.77	0.78
Ability score maths 10 (on scale of 0–20)	0.56	-1.17	-0.39	1.00	0.46	-0.95	-0.71	1.20
Ability score maths 15 (on scale of 0–20)	-0.96	1.13	0.86	-1.04	-0.70	0.90	1.09	-1.28

Source: LSAY 1995 cohort.

Personality traits

Table 2 displays the results for the scenario analyses related to personality traits. Before discussing a number of them, we note that in general the magnitudes of the effects for personality are larger than those for the personal characteristics, with some of them in the order of 5–10 percentage points.

For each of the personality traits we simulate rating possession of these traits from the highest level to the lowest level. The one personality trait that appears to have a relatively strong effect for both males and females is being 'agreeable'. Males who are less agreeable are more likely to be employed as a casual at the expense of working permanently. The scenario in which all males would report the lowest level of being agreeable would reduce the proportion of men employed permanently by about five to six percentage points, but increase the proportion employed casually by about seven percentage points.[16] Women who are less agreeable are more likely to be employed casually or to leave the labour market, at the expense of working permanently. Unlike the case for men, the overall employment rate for women would be reduced in this case.

Confidence seems to play a much bigger role for females than it does for males, for whom it has little impact. The scenario in which all women would report the lowest level of confidence would, compared with the status quo, reduce the proportion of women employed (either casually or permanently) by about four or five percentage points and lift the proportion of women not in the labour force by a similar margin.[17] Where men are more sensitive than women is popularity. Being less popular means males are much less likely to be employed permanently and more likely to be employed in the three remaining states of casual employment, unemployment or out of the labour force.

[16] In table 2 the numbers for 'agreeable (least)' point to a reduction in the proportion employed permanently of 4.90 percentage points in the specification without random effects and 5.74 percentage points in the specification with random effects, respectively.

[17] Using the numbers for 'confident' in table 2, the reduction in the proportion employed is 5.84 percentage points (3.84 + 2.01) in the specification without random effects and 6.86 percentage points (5.45 + 1.41) in the specification with random effects.

Table 2a Males: Results from what-if scenarios based on parameter estimates—Personality (%)

	Specification without random effects				Specification with (correlated) random effects			
Labour market state (dependent variable)	Permanent	Casual	Unemployed	Not in labour force	Permanent	Casual	Unemployed	Not in labour force
Predicted labour market states at observed data values	86.67	8.58	2.36	2.40	87.26	7.89	2.65	2.20
Changes to these base predictions if everyone were:								
Agreeable (most)	0.75	-1.82	0.36	0.71	0.90	-1.97	0.28	0.79
Agreeable (least)	-4.90	6.86	-0.74	-1.21	-5.74	7.63	-0.63	-1.27
Open (most)	-1.06	0.20	-0.22	1.08	-1.05	0.32	-0.26	0.99
Open (least)	2.02	-0.78	0.62	-1.86	2.06	-1.17	0.80	-1.69
Popular (most)	3.19	-1.63	-0.76	-0.80	3.87	-2.12	-0.81	-0.93
Popular (least)	-8.49	4.13	1.96	2.40	-11.16	5.96	1.95	3.25
Intellectual (most)	-1.31	-0.26	0.44	1.13	-1.73	0.03	0.47	1.24
Intellectual (least)	1.73	0.46	-0.80	-1.40	2.42	-0.15	-0.86	-1.41
Calm (most)	-1.27	1.28	-0.19	0.18	-1.47	1.58	-0.20	0.09
Calm (least)	2.77	-2.83	0.54	-0.48	2.93	-3.22	0.58	-0.28
Hard-working (most)	-0.90	1.17	0.19	-0.46	-1.25	1.41	0.30	-0.47
Hard-working (least)	1.84	-3.35	-0.50	2.02	2.34	-3.65	-0.78	2.09
Outgoing (most)	-0.31	0.64	-0.14	-0.19	-0.69	0.99	-0.15	-0.16
Outgoing (least)	0.82	-1.73	0.33	0.58	1.62	-2.43	0.35	0.47
Confident (most)	-0.05	0.15	-0.46	0.36	0.14	-0.10	-0.49	0.45
Confident (least)	-0.26	-0.46	1.57	-0.86	-0.96	0.29	1.65	-0.97

Source: LSAY 1995 cohort.

Table 2b Females: Results from what-if scenarios based on parameter estimates—Personality (%)

	Specification without random effects				Specification with (correlated) random effects			
Labour market state (dependent variable)	Permanent	Casual	Unemployed	Not in labour force	Permanent	Casual	Unemployed	Not in labour force
Predicted labour market states at observed data values	85.42	3.86	2.93	7.78	84.48	3.05	5.98	6.50
Changes to these base predictions if everyone were:								
Agreeable (most)	1.81	-0.58	-0.10	-1.13	2.03	-0.60	-0.09	-1.35
Agreeable (least)	-6.11	2.16	0.25	3.70	-7.29	2.43	-0.01	4.87
Open (most)	-0.25	0.14	0.03	0.08	-0.29	0.21	-0.02	0.10
Open (least)	1.02	-0.63	-0.10	-0.30	1.19	-0.89	0.06	-0.37
Popular (most)	-2.55	2.38	0.83	-0.66	-2.14	1.93	1.02	-0.81
Popular (least)	2.68	-2.54	-1.17	1.04	2.40	-2.11	-1.77	1.49
Intellectual (most)	0.24	-0.96	-0.51	1.24	-0.07	-0.75	-0.71	1.53
Intellectual (least)	-2.10	3.04	1.19	-2.14	-1.31	2.32	1.39	-2.40
Calm (most)	-0.56	-0.07	0.24	0.39	-1.01	0.14	0.46	0.41
Calm (least)	1.18	0.17	-0.48	-0.87	2.20	-0.34	-0.95	-0.91
Hard-working (most)	-1.20	1.18	-0.20	0.22	-1.17	1.36	-0.54	0.36
Hard-working (least)	2.67	-2.57	0.70	-0.81	2.02	-2.49	1.72	-1.25
Outgoing (most)	-0.04	0.13	-0.35	0.26	-0.21	0.35	-0.49	0.35
Outgoing (least)	0.05	-0.52	1.25	-0.78	0.56	-1.19	1.63	-1.01
Confident (most)	1.02	1.07	-0.29	-1.80	1.74	0.66	-0.67	-1.72
Confident (least)	-3.83	-2.01	0.59	5.25	-5.45	-1.41	1.37	5.49

Source: LSAY 1995 cohort.

Post-school qualifications and previous labour market state

Table 3 shows the results for the scenario analyses for post-school qualifications and previous period labour market states, separately for males and females. The magnitudes of the effects are much larger than those in the scenarios discussed up to now. In particular, previous period labour market state has a large impact, as would be expected from the literature on labour market dynamics. Furthermore, the inclusion of random effects has a much larger effect here, dampening the strong persistence that is found when not controlling for unobserved heterogeneity. The latter finding on dampening the persistence is also a common result in the literature on labour market dynamics.

In relation to the qualifications, when it comes to the probability of being in work (that is, permanent and casual combined), any qualification is better than none, but the strongest boost for women is provided by a certificate IV, closely followed by bachelor degree or better. For males the employment effects are smaller, but the biggest boost to overall employment is provided by a bachelor degree or better. A scenario in which all men and women would have a certificate IV increases the employment probability for both, relative to the status quo, but it affects men and women differently. For men it increases the proportion employed permanently but reduces the proportion employed as a casual. For women, the reverse holds.

When interpreting the effects of the scenarios, it is important to remember that they are expressed as percentage point changes from the base projections. A fair comparison of the role of post-school qualifications would be to compare it with having no post-school qualifications. For instance, in the model without random effects, not having any post-school qualifications reduces the probability of being in permanent employment by 5.8 percentage points for women and 1.8 percentage points for men, all else being equal. Having a bachelor degree or better increases it by 2.7 percentage points for men and 5.5 percentage points for women. Therefore, the net effect of having a bachelor degree or better vis-à-vis no qualification on the probability of being employed permanently is an increase of 4.5 percentage points for men (on a base of about 86%) and 11.3 percentage points for women (on a base of about 85%).

When it comes to the previous period labour market state, it is shown that the most persistent states are casual employment for men and not being in the labour force for women. These scenarios show the largest percentage point changes with respect to the base predictions. Although the magnitudes of the persistence differ when unobserved heterogeneity is controlled for or not (with persistence deemed much larger in the case of the latter), the trade-offs operate the same way. By that we mean that simulating a scenario whereby women are not in the labour force increases the predicted proportion of women not in the labour force next period almost completely at the expense of a reduced proportion of respondents employed in a permanent job. This actually holds true for men as well. Similarly, simulating men in casual employment this period will lead to an increased predicted proportion of men employed casually next period, but this comes exclusively at the expense of a reduced proportion of respondents working in permanent jobs.

As an example to bring the magnitudes of the simulated scenarios to life, consider the following: compared with not being in the labour force, being full-time permanently employed in the previous period would increase the proportion of women permanently employed this period by a very large 38.6 percentage points in the specification without random effects and a more modest, but still large, 19.4 percentage points when unobserved heterogeneity is controlled for.[18] These numbers are large, but this is a direct result of using a rather radical scenario comparison: full-time permanent employment compared with not being in the labour force (in the previous period). For men the corresponding effects are smaller, at 17.4 and 10.0 percentage points, respectively.

[18] The number 38.56 is obtained by comparing the difference between the numbers -30.04 and +8.52, which are the effects in table 3b on the predicted proportion in permanent employment for the not in labour force and full-time permanent employment scenarios, respectively. Similarly, the number 19.38 is the difference between -14.65 and +4.73.

Comparing the scenario results for lagged labour market states as a group, it is clear that *not* controlling for unobserved heterogeneity will severely exaggerate the influence (including persistence) of being out of the labour force for women and casual employment for men. The effects of the other labour market states are much less sensitive to the inclusion of the random effects. Furthermore, the fact that lagged labour market states still have an impact after controlling for unobserved heterogeneity by the inclusion of random effects shows that part of the observed persistence should be considered genuine.

Table 3a Males: Results from what-if scenarios based on parameter estimates—Qualifications and past labour market status (%)

	Specification without random effects				Specification with (correlated) random effects			
Labour market state (dependent variable)	Permanent	Casual	Unemployed	Not in labour force	Permanent	Casual	Unemployed	Not in labour force
Predicted labour market states at observed data values	86.67	8.58	2.36	2.40	87.26	7.89	2.65	2.20
Changes to these base predictions if everyone were:								
No post-school qualifications	-1.82	-0.55	1.16	1.21	-1.68	-0.62	1.28	1.03
Certificate I or II	0.21	-1.01	-1.03	1.83	0.44	-1.02	-1.11	1.70
Certificate III	-0.74	0.93	-0.21	0.02	-0.34	0.60	-0.15	-0.11
Certificate IV	3.09	-2.20	-1.42	0.53	3.11	-2.10	-1.73	0.72
Certificate – level unknown	-2.99	4.12	-1.17	0.04	-4.54	5.87	-1.12	-0.21
Advanced diploma/dip. (includes assoc. dip.)	-0.68	0.66	1.18	-1.15	-0.72	0.39	1.37	-1.04
Bachelor degree or higher	2.68	-1.01	-0.55	-1.11	2.95	-1.38	-0.62	-0.95
1 period lagged status – Not in labour force	-9.88	-3.42	2.11	11.19	-5.54	-1.54	2.48	4.60
1 period lagged status – FT permanent	7.49	-5.53	-0.87	-1.09	4.47	-2.88	-0.87	-0.72
1 period lagged status – PT permanent	-1.37	-2.16	1.45	2.09	-4.41	0.49	1.75	2.17
1 period lagged status – Casual	-44.94	44.52	1.38	-0.97	-15.70	15.13	1.44	-0.86
1 period lagged status – Unemployed	-5.54	-1.03	2.84	3.73	-3.37	-1.74	1.98	3.13
Initial condition (2002) – Not in labour force	-4.40	-0.84	3.12	2.12	-5.91	-1.60	3.71	3.81
Initial condition (2002) – FT permanent	1.61	-0.97	-0.72	0.08	3.52	-2.68	-0.87	0.02
Initial condition (2002) – PT permanent	4.08	-1.91	-1.03	-1.14	5.92	-3.62	-1.24	-1.06
Initial condition (2002) – Casual	-8.46	7.84	-1.38	2.00	-28.41	27.21	-0.53	1.73
Initial condition (2002) – Unemployed	-2.27	-2.38	4.66	-0.01	-3.70	-1.87	5.91	-0.33

Source: LSAY 1995 cohort.

Table 3b Females: Results from what-if scenarios based on parameter estimates—Qualifications and past labour market status (%)

	Specification without random effects				Specification with (correlated) random effects			
Labour market state (dependent variable)	Permanent	Casual	Unemployed	Not in labour force	Permanent	Casual	Unemployed	Not in labour force
Predicted labour market states at observed data values	85.42	3.86	2.93	7.78	84.48	3.05	5.98	6.50
Changes to these base predictions if everyone were:								
No post-school qualifications	-5.77	1.36	1.27	3.14	-6.54	1.09	1.95	3.50
Certificate I or II	-3.84	0.41	1.64	1.79	-4.70	0.34	2.52	1.84
Certificate III	-2.09	3.04	-1.12	0.17	-0.40	2.04	-1.97	0.33
Certificate IV	-2.20	9.05	-1.97	-4.88	0.31	7.56	-3.80	-4.07
Certificate – level unknown	-3.79	0.00	1.50	2.29	-5.74	0.84	2.56	2.34
Advanced diploma/dip. (includes assoc. dip.)	-0.83	-0.66	-0.23	1.72	-2.55	1.18	-0.56	1.93
Bachelor degree or higher	5.51	-1.35	-0.61	-3.55	5.60	-1.30	-0.77	-3.54
1 period lagged status – Not in labour force	-30.04	-1.44	4.25	27.23	-14.65	-1.38	4.92	11.12
1 period lagged status – FT permanent	8.52	-2.47	-1.26	-4.79	4.73	-0.63	-1.30	-2.79
1 period lagged status – PT permanent, or casual	-3.71	6.25	-0.23	-2.31	-1.47	1.40	0.67	-0.60
1 period lagged status –Unemployed	-6.59	-0.97	5.17	2.39	-5.98	1.66	4.93	-0.61
Initial condition (2002) – Not in labour force	-4.94	0.10	1.83	3.00	-12.50	0.22	4.50	7.78
Initial condition (2002) – FT permanent	4.01	-1.05	-1.23	-1.73	5.67	-1.39	-1.73	-2.55
Initial condition (2002) – PT permanent, or casual	-1.02	1.22	-0.39	0.19	-1.84	2.64	-0.65	-0.15
Initial condition (2002) – Unemployed	-3.96	-3.40	4.36	3.00	-9.27	-2.57	8.74	3.10

Source: LSAY 1995 cohort.

Post-school qualifications and previous labour market state combined

Table 4 presents the role of post-school qualifications and previous labour market state independently. That is, scenarios changed only one of these, while keeping the other at observed values. Table 4 reports results for scenarios that include both qualifications and lagged outcomes simultaneously. This will provide an insight into the labour market dynamics for different levels of post-school qualifications. We limit our discussion to the results based on the specification with controls for unobserved heterogeneity, as omitting the random effects leads to exaggerated rates of persistence. That is, we focus on the genuine effect of past labour market states.

The scenarios in table 4 compare findings for two undesirable labour market states, that is, not being in the labour force and unemployment, and one less desirable labour market outcome, casual employment. In the specification for women, casual employment was combined with part-time permanent employment because the data did not support the more detailed model for women.[19] By conducting a scenario analysis of being in each of these labour market states in the previous period while simultaneously setting a chosen level of post-school qualification, we can study the effect of qualifications on the persistence in labour market outcomes.

When simulating being out of the labour force in the previous period, the effect on the probability of being permanently employed in the current period was found to be -5.5 percentage points for men (table 3a, with random effects) and -14.6 percentage points for women (table 3b, with random effects). When related to the post-school qualification level, we see that this negative effect of the permanent employment probability ranges from almost no effect when combined with having a bachelor degree or higher (-0.2 percentage points for men; -4.8 percentage points for women) to a maximum of -9.6 percentage points for men (-27.3 percentage points for women), if being out of the labour force in the previous period is compounded by having no post-school qualifications (table 4). In line with the independent effect of qualifications in table 4, having a bachelor degree for men and women, or a certificate IV for women, is shown to provide the best buffer against being out of the labour force becoming a persistent state.

The story for the unemployment scenario is very much the same as that for being out of the labour force when it comes to the probability of being permanently employed. The only difference is that the impacts are much smaller, ranging from negligible when unemployment is combined with having a bachelor degree or better, to -6.9 percentage points for men when unemployment is combined with having no post-school qualifications, and -14.6 percentage points for women (table 4).

It would be tempting to conclude that being unemployed is better than being out of the labour force, because the effects of the former on the probability of being permanently employed are smaller. There is an important gender effect here, since for men the difference is not particularly large. For men, the effects on permanent employment of a bachelor degree are 1.4 and -0.2 percentage points, and the effects of no qualifications are -6.9 and -9.6 percentage points, depending on being related to unemployment or being out of the labour force. For women the corresponding figures are -4.8 and 0.9 percentage points, and -27.3 and -14.6 percentage points, respectively. Thus, it is indeed the case that being unemployed is better than being out of the labour force when only looking at the probability of being permanently employed, but what these results are really indicating is that not being in the labour market is a much more persistent state, in particular for women. That is why simulating being out of the labour force in the previous period is so damaging to the current

[19] Strictly speaking, each of these states could be considered the right choice under certain circumstances. Because we restrict the sample to those who have completed their post-school qualifications, the persons not in the labour force are not enrolled in some form of study leading to a qualification. However, they may have made a personal choice to become a homemaker, are taking a gap year or have caring responsibilities. Furthermore, casual employment is, to a large extent, voluntary and does not by definition imply that it is a second-choice outcome. Casual jobs are jobs with fewer benefits such as paid leave and sick leave, but they are a flexible form of employment which may be attractive to young people and typically attract a wage premium to compensate for the absence of job security and lack of benefits. Even unemployment, if frictional, can be beneficial in providing a means to search for a better job match.

permanent employment prospects of women: the respondents are likely to still be out of the labour force in the current period. Unemployment is also 'sticky' in a sense, but much less so.[20]

Finally, on the results for lagged casual employment related to post-school qualifications for males, table 4 shows that the effects on the two (current) employment states are large. This is to be expected because we know from table 3 that casual employment is a highly persistent state for men and that, in scenarios where lagged labour market status was set to be casual, the increased probability to be employed casual this period came at the expense of the probability to be employed permanently. But apart from the larger effects, in absolute terms, of lagged casual employment interacted with qualification levels on the two employment outcomes, the difference between the qualification levels themselves is very similar to the case where qualification levels were related to lagged unemployment or lagged not in the labour force. Using the results from table 4 for males, the difference between bachelor degree or higher and no qualifications on the probability to be permanently employed is 9.4 percentage points when related to lagged not in the labour force (difference between -9.6 and -0.2), 8.3 percentage points when related to lagged unemployment (difference between -6.9 and 1.4), and 6.6 percentage points when related to lagged casual employment (difference between -17.1 and -10.5).

[20] When analysing the effects of being out of the labour force or unemployed in the previous period on the probability of being unemployed today, it shows that being unemployed in the previous period is worse than being out of the labour force, as one would expect. This is true for both males and females.

Table 4a Males: Results from what-if scenarios based on parameter estimates—Qualifications and (select) past labour market status, combined (%)

Labour market state (dependent variable)	Specification without random effects				Specification with (correlated) random effects			
	Permanent	Casual	Unemployed	Not in labour force	Permanent	Casual	Unemployed	Not in labour force
Predicted labour market states at observed data values	86.67	8.58	2.36	2.40	87.26	7.89	2.65	2.20
Changes to these base predictions if everyone were:								
1 period lagged status – Not in labour force AND								
No post-school qualifications	-16.31	-4.29	3.94	16.66	-9.57	-2.37	4.68	7.26
Certificate I or II	-14.52	-4.81	-0.05	19.37	-6.49	-2.84	0.24	9.09
Certificate III	-10.23	-2.32	1.71	10.84	-5.47	-0.85	2.19	4.13
Certificate IV	-6.87	-5.69	-0.64	13.20	-1.80	-3.82	-0.88	6.50
Certificate – level unknown	-12.58	1.83	-0.09	10.85	-9.30	5.16	0.35	3.79
Advanced diploma/dip. (includes assoc. dip.)	-7.00	-2.36	4.64	4.71	-5.62	-0.94	5.15	1.41
Bachelor degree or higher	-1.75	-4.28	1.19	4.83	-0.17	-2.86	1.34	1.69
1 period lagged status – Unemployed AND								
No post-school qualifications	-9.79	-2.02	5.28	6.53	-6.87	-2.50	4.06	5.32
Certificate I or II	-6.02	-2.67	0.55	8.14	-3.83	-2.95	-0.02	6.80
Certificate III	-6.41	0.55	2.38	3.47	-3.38	-1.08	1.71	2.75
Certificate IV	-0.33	-4.19	-0.28	4.80	0.36	-3.94	-1.06	4.64
Certificate – level unknown	-9.94	6.28	0.26	3.40	-7.27	4.75	0.05	2.47
Advanced diploma/dip. (includes assoc. dip.)	-6.12	0.15	5.40	0.57	-3.74	-1.21	4.37	0.58
Bachelor degree or higher	0.15	-2.45	1.64	0.66	1.38	-3.07	0.91	0.79
1 period lagged status – Casual *AND*								
No post-school qualifications	-45.65	42.53	3.35	-0.23	-17.08	13.87	3.43	-0.22
Certificate I or II	-40.95	40.67	-0.06	0.35	-12.89	12.80	-0.20	0.30
Certificate III	-50.23	50.77	0.65	-1.20	-17.52	17.42	1.12	-1.02
Certificate IV	-32.08	32.99	-0.55	-0.35	-7.87	9.35	-1.17	-0.31
Certificate – level unknown	-60.42	63.02	-1.10	-1.50	-28.95	30.73	-0.53	-1.25
Advanced diploma/dip. (includes assoc. dip.)	-49.68	48.86	2.62	-1.79	-18.37	16.64	3.30	-1.58
Bachelor degree or higher	-39.31	40.34	0.63	-1.66	-10.45	11.46	0.47	-1.48

Source: LSAY 1995 cohort.

Table 4b Females: Results from what-if scenarios based on parameter estimates—Qualifications and (select) past labour market status, combined (%)

	Specification without random effects				Specification with (correlated) random effects			
Labour market state (dependent variable)	Permanent	Casual	Unemployed	Not in labour force	Permanent	Casual	Unemployed	Not in labour force
Predicted labour market states at observed data values	85.42	3.86	2.93	7.78	84.48	3.05	5.98	6.50
Changes to these base predictions if everyone were:								
1 period lagged status – Not in labour force *AND*								
No post-school qualifications	-47.09	-1.39	6.07	42.42	-27.30	-0.96	6.93	21.33
Certificate I or II	-43.22	-1.75	7.38	37.60	-24.11	-1.35	8.32	17.15
Certificate III	-34.08	0.41	1.55	32.11	-15.15	-0.10	1.41	13.84
Certificate IV	-15.38	8.12	-0.09	7.35	-4.48	4.52	-1.15	1.11
Certificate –level unknown	-44.23	-2.02	6.88	39.37	-25.58	-1.09	8.24	18.42
Advanced diploma/dip. (includes assoc. dip.)	-38.94	-2.24	3.29	37.89	-20.45	-0.78	3.41	17.83
Bachelor degree or higher	-15.70	-2.14	3.63	14.21	-4.82	-2.11	4.46	2.47
1 period lagged status – Unemployed *AND*								
No post-school qualifications	-17.40	-0.25	8.95	8.70	-14.64	3.03	8.25	3.36
Certificate I or II	-15.02	-0.96	9.87	6.11	-12.60	1.97	9.16	1.47
Certificate III	-7.05	1.49	2.23	3.33	-6.16	4.63	1.51	0.02
Certificate IV	-2.62	7.79	-0.43	-4.73	-5.72	12.49	-2.15	-4.63
Certificate – level unknown	-15.24	-1.26	9.50	7.00	-13.88	2.66	9.21	2.01
Advanced diploma/dip. (includes assoc. dip.)	-9.11	-1.66	4.74	6.03	-9.12	3.30	4.05	1.77
Bachelor degree or higher	1.87	-2.09	3.21	-2.99	0.89	-0.29	3.46	-4.05
1 period lagged status – PT permanent, or casual *AND*								
No post-school qualifications	-11.80	9.33	1.18	1.30	-9.23	2.82	2.88	3.54
Certificate I or II	-8.43	6.97	1.54	-0.08	-7.00	1.80	3.53	1.66
Certificate III	-9.59	13.34	-1.37	-2.37	-2.36	4.15	-1.61	-0.19
Certificate IV	-17.58	26.42	-2.29	-6.55	-2.87	11.43	-3.83	-4.74
Certificate – level unknown	-7.92	5.96	1.45	0.50	-8.26	2.47	3.56	2.23
Advanced diploma/dip. (includes assoc. dip.)	-3.64	4.30	-0.36	-0.30	-4.66	2.97	0.03	1.67
Bachelor degree or higher	3.87	2.48	-0.99	-5.36	4.88	-0.47	-0.33	-4.08

Source: LSAY 1995 cohort.

Conclusion

This study examined year-on-year transitions of labour market states for young Australians who completed their post-school education and training. The analysis models year-on-year transitions and does not follow the more commonly used approach of taking a (sub) sample of individuals at one point in time (for example, first year after leaving school) and then modelling the labour market state, say, five years later. Of key interest are the role that post-school qualifications play in transitions between labour market states and how much of the persistence can be assigned to the previous period labour market state per se and how much is attributable to unobserved heterogeneity. In studies of labour market transitions, it is often found that not controlling for such unobserved heterogeneity tends to overstate the role of past labour market states on current labour market states. We find this to indeed be the case, but mainly for two labour market states: casual employment for men and being out of the labour force for women.

Most studies on labour market dynamics for the adult labour market show that observed state dependence (occupying the same labour market state in consecutive periods) is much reduced when controlling for unobservable heterogeneity. So while at first glance it appears that getting people into work and out of unemployment will lead to a large proportion of these people being employed in the future ('high state dependence', 'work leads to work' etc.), controlling for unobservables now changes the perspective and indicates that this 'work leads to work' mechanism is only temporary and people will revert to their previous state. Some will stay in employment of course, but fewer than would appear at first glance. The greater the role/impact of unobservables (as captured here by random effects), the less permanent the effect of public policy will be. To use a vintage toy analogy, the greater the role/impact of unobservables in driving transitions between labour market states, the more the distribution of labour market states will resemble a roly-poly doll.[21] Policy will only be effective in temporarily altering the distribution of labour market states, but preferences will return the distribution back towards the previous state unless the policy intervention is sustained.

What we find in our study is that the observed state dependence is indeed reduced when controlling for unobservables. In the context of the labour market states other than casual employment in the case of men and not in the labour force in the case of women, the reduction in persistence is modest when compared with these latter two cases. The direct implication is that public policy would still be effective, since we do find there is genuine state dependence in labour market states, but that the effect will be less than could be expected based on observed persistence in the (raw) data. That is, a sizable chunk of the persistence is due to a common underlying process (unobserved heterogeneity) that will claw back much of the initial policy response over time. In particular, any policy that would momentarily increase the proportion of men working casually or would lead women to leave the labour market will have a lasting positive effect on the proportion of men working casually, or women being out of the labour force, in the subsequent period—as we do find there is such a genuine impact—but these will be much smaller than what might be expected if that certain *je ne sais quoi* captured by the controls for unobserved heterogeneity is ignored.

Although previous period labour market states trump all other factors that are important in predicting current labour market states, this does not mean the other factors should be dismissed—these still matter. A policy leading to all young Australian females collectively taking a gap year this

[21] A roly-poly doll is defined as a tumbler toy. When such a toy is pushed over, it wobbles for a few moments while it seeks to return to an upright position.

period (that is, place them in the 'not in labour force' state or 'unemployment') would be completely offset, in terms of impact on next period's labour market outcome, if this policy resulted in these women's post-school qualification levels being lifted to at least a certificate IV. And to give an example of a soft-skills policy, lifting young Australian women's confidence to a point where they all respond as being very confident would increase their proportion in permanent employment by close to 1–2 percentage points (on top of a base prediction of about 85%) and about one percentage point extra in casual employment, while reducing unemployment and exits from the labour force.

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Appendix

Table A1 Parameter estimates of (mixed) multinomial logits with and without (correlated) random effects

	Without random effects			With (correlated) random effects		
	Permanent	Casual	Unemployed	Permanent	Casual	Unemployed
Constant	0.716	-2.272	-0.071	1.247	-2.562	0.239
	[0.524]	[0.165]	[0.963]	[0.515]	[0.351]	[0.915]
Male	**0.708**	**1.108**	**0.456**	**0.865**	**1.308**	0.546
	[0.000]	[0.000]	[0.068]	[0.003]	[0.001]	[0.131]
Born overseas – Mainly English speaking	-0.414	-0.192	-0.362	-0.313	-0.152	-0.227
	[0.282]	[0.738]	[0.568]	[0.584]	[0.884]	[0.785]
Born overseas – Non-English speaking	0.386	0.242	0.236	0.481	0.289	0.271
	[0.397]	[0.680]	[0.676]	[0.490]	[0.782]	[0.713]
Parents' occupation class – Upper-middle	0.322	0.507	0.402	0.335	0.624	0.437
	[0.246]	[0.194]	[0.319]	[0.401]	[0.293]	[0.390]
Parents' occupation class – Lower-middle	0.346	**0.630**	0.210	0.414	0.763	0.307
	[0.179]	[0.084]	[0.580]	[0.285]	[0.175]	[0.528]
Parents' occupation class – Lower	0.158	0.168	0.428	0.182	0.142	0.488
	[0.551]	[0.666]	[0.272]	[0.646]	[0.808]	[0.354]
Married	**-0.867**	**-0.483**	**-1.246**	**-1.000**	-0.435	**-1.343**
	[0.000]	[0.067]	[0.000]	[0.000]	[0.259]	[0.001]
De facto	-0.249	-0.351	**-0.710**	-0.128	-0.257	**-0.659**
	[0.170]	[0.178]	[0.014]	[0.639]	[0.502]	[0.098]
Ability score reading (on scale of 0–20)	**-0.256**	-0.326	**-0.505**	-0.357	-0.467	**-0.584**
	[0.079]	[0.109]	[0.009]	[0.145]	[0.172]	[0.041]
Ability score reading – Squared	**0.009**	0.011	**0.017**	0.012	0.016	**0.020**
	[0.099]	[0.137]	[0.018]	[0.168]	[0.202]	[0.058]
Ability score maths (on scale of 0–20)	0.020	0.139	0.217	0.100	0.243	0.286
	[0.881]	[0.480]	[0.257]	[0.608]	[0.490]	[0.280]
Ability score maths – Squared	0.000	-0.002	-0.006	-0.002	-0.005	-0.008
	[0.930]	[0.764]	[0.453]	[0.766]	[0.691]	[0.434]
Agreeable (scale 1–4)	-0.123	0.250	-0.154	-0.160	0.308	-0.158
	[0.490]	[0.316]	[0.553]	[0.543]	[0.411]	[0.611]
Open (scale 1–4)	0.148	0.024	0.174	0.180	0.005	0.213
	[0.275]	[0.901]	[0.385]	[0.383]	[0.988]	[0.433]
Popular (scale 1–4)	-0.208	-0.162	-0.208	-0.307	-0.274	-0.282
	[0.195]	[0.500]	[0.382]	[0.185]	[0.486]	[0.405]
Intellectual (scale 1–4)	0.211	0.309	0.219	0.285	0.379	0.265
	[0.178]	[0.171]	[0.347]	[0.287]	[0.317]	[0.432]
Calm (scale 1–4)	0.085	-0.096	0.081	0.105	-0.167	0.087
	[0.452]	[0.559]	[0.625]	[0.544]	[0.521]	[0.686]
Hardworking (scale 1–4)	-0.030	**-0.374**	-0.065	-0.016	**-0.488**	-0.055
	[0.813]	[0.038]	[0.723]	[0.933]	[0.099]	[0.823]

	Without random effects			With (correlated) random effects		
	Permanent	Casual	Unemployed	Permanent	Casual	Unemployed
Outgoing (scale 1–4)	0.002	-0.101	0.104	0.014	-0.209	0.097
	[0.985]	[0.573]	[0.586]	[0.943]	[0.445]	[0.726]
Confident (scale 1–4)	**-0.244**	**-0.378**	-0.018	-0.264	-0.318	-0.007
	[0.062]	[0.046]	[0.926]	[0.191]	[0.295]	[0.978]
Certificate I or II	0.130	-0.276	-0.061	0.135	-0.331	-0.106
	[0.590]	[0.472]	[0.872]	[0.713]	[0.606]	[0.828]
Certificate III	**0.500**	0.466	-0.407	0.664	0.494	-0.299
	[0.058]	[0.237]	[0.390]	[0.106]	[0.441]	[0.640]
Certificate IV	**1.135**	**1.305**	-0.549	**1.259**	**1.500**	-0.554
	[0.009]	[0.015]	[0.510]	[0.045]	[0.061]	[0.604]
Certificate – Level unknown	0.242	**0.764**	-0.156	0.270	**1.052**	-0.147
	[0.361]	[0.030]	[0.720]	[0.511]	[0.047]	[0.791]
Advanced dip./dip. (incl. assoc. dip.)	0.397	0.137	0.100	0.457	0.219	0.133
	[0.120]	[0.737]	[0.798]	[0.275]	[0.722]	[0.814]
Bachelor degree or higher	**1.482**	**0.936**	**0.578**	**1.792**	**1.004**	**0.765**
	[0.000]	[0.002]	[0.054]	[0.000]	[0.027]	[0.052]
initial condition (2002) – FT permanent	**0.919**	0.329	-0.458	**2.065**	0.865	0.206
	[0.000]	[0.433]	[0.208]	[0.000]	[0.279]	[0.701]
initial condition (2002) – PT permanent	**0.680**	0.413	-0.408	**1.728**	1.024	0.210
	[0.007]	[0.334]	[0.278]	[0.000]	[0.197]	[0.687]
initial condition (2002 – Casual	0.091	0.870	-1.676	0.218	**2.957**	-1.583
	[0.858]	[0.156]	[0.151]	[0.829]	[0.040]	[0.409]
initial condition (2002) – Unemployed	0.036	-0.705	0.252	0.615	-0.462	0.688
	[0.899]	[0.196]	[0.505]	[0.179]	[0.615]	[0.185]
1 period lagged status – FT permanent	**3.330**	**2.619**	**1.400**	**2.383**	**2.246**	**0.854**
	[0.000]	[0.000]	[0.000]	[0.000]	[0.014]	[0.054]
1 period lagged status – PT permanent	**2.483**	**2.389**	**1.325**	**1.520**	**2.000**	0.777
	[0.000]	[0.000]	[0.000]	[0.000]	[0.033]	[0.112]
1 period lagged status – Casual	**1.998**	**5.566**	1.303	**1.699**	**4.472**	1.081
	[0.000]	[0.000]	[0.102]	[0.014]	[0.001]	[0.382]
1 period lagged status – Unemployed	**1.741**	**1.913**	**1.567**	**1.385**	1.832	**1.283**
	[0.000]	[0.002]	[0.000]	[0.001]	[0.111]	[0.014]
Standard deviation of random effect (permanent)				**1.434**		
				[0.000]		
Standard deviation of random effect (casual)				**1.424**		
				[0.097]		
Standard deviation of random effect (unemployed)				**0.747**		
				[0.076]		
Correlation between random effects (casual, permanent)				-0.208		
Correlation between random effects (unemployed, permanent)				-0.927		
Correlation between random effects (casual, unemployed)				0.264		
N (1482 individuals * 4 waves)	5928			5928		
Log likelihood	-2146.255			-2126.594		
Log likelihood (constants only)	-3276.128			-3276.128		
R-squared	0.345			0.351		
R-squared (adjusted)	0.341			0.347		
Degrees of freedom	105			111		

Note: The reference (omitted) categories are: female, Australian born, parents' occupation class – upper, no post-school qualifications, initial condition (2002) – not in labour force, and 1 period lagged status – not in labour force.

Source: LSAY 1995 cohort.

Table A2 Males: Parameter estimates of (mixed) multinomial logits with and without (correlated) random effects

	Without random effects			With (correlated) random effects		
	Permanent	Casual	Unemployed	Permanent	Casual	Unemployed
Constant	-0.340	-3.600	-3.865	0.615	-3.340	-2.656
	[0.892]	[0.221]	[0.277]	[0.909]	[0.618]	[0.714]
Born overseas	-0.001	0.198	-0.222	-0.047	0.269	-0.253
	[0.999]	[0.765]	[0.763]	[0.968]	[0.839]	[0.853]
Parents' occupation class – Upper-middle	**0.981**	**1.501**	0.508	0.935	1.610	0.504
	[0.037]	[0.010]	[0.413]	[0.274]	[0.161]	[0.647]
Parents' occupation class – Lower-middle	**0.829**	**1.244**	0.226	0.790	1.317	0.165
	[0.038]	[0.017]	[0.686]	[0.378]	[0.244]	[0.886]
Parents' occupation class – Lower	0.577	0.341	0.120	0.536	0.136	0.052
	[0.183]	[0.554]	[0.843]	[0.565]	[0.914]	[0.968]
Married or de facto	**0.809**	**0.884**	0.030	0.813	0.868	-0.024
	[0.058]	[0.061]	[0.960]	[0.343]	[0.331]	[0.984]
Ability score reading (on scale of 0–20)	-0.349	-0.556	-0.436	-0.419	-0.737	-0.537
	[0.264]	[0.120]	[0.305]	[0.593]	[0.402]	[0.535]
Ability score reading – Squared	0.014	**0.023**	0.018	0.017	0.030	0.022
	[0.225]	[0.092]	[0.266]	[0.564]	[0.375]	[0.514]
Ability score maths (on scale of 0–20)	0.087	0.254	0.511	0.130	0.347	0.531
	[0.739]	[0.429]	[0.197]	[0.829]	[0.655]	[0.499]
Ability score maths – Squared	-0.004	-0.010	-0.021	-0.006	-0.013	-0.021
	[0.655]	[0.425]	[0.159]	[0.795]	[0.667]	[0.468]
Agreeable (scale 1–4)	0.329	**0.875**	0.165	0.395	1.069	0.265
	[0.308]	[0.029]	[0.707]	[0.590]	[0.240]	[0.796]
Open (scale 1–4)	**0.680**	**0.584**	**0.763**	0.695	0.537	0.802
	[0.020]	[0.085]	[0.052]	[0.287]	[0.481]	[0.338]
Popular (scale 1–4)	-0.487	-0.038	-0.051	-0.676	-0.012	-0.247
	[0.142]	[0.923]	[0.909]	[0.246]	[0.987]	[0.783]
Intellectual (scale 1–4)	0.483	0.519	0.246	0.585	0.544	0.342
	[0.156]	[0.200]	[0.596]	[0.490]	[0.601]	[0.769]
Calm (scale 1–4)	0.130	-0.241	0.205	0.098	-0.400	0.183
	[0.572]	[0.398]	[0.502]	[0.818]	[0.446]	[0.748]
Hardworking (scale 1–4)	-0.286	**-0.702**	-0.405	-0.318	-0.857	-0.488
	[0.228]	[0.015]	[0.221]	[0.582]	[0.232]	[0.504]
Outgoing (scale 1–4)	-0.106	-0.307	-0.042	-0.086	-0.423	-0.023
	[0.668]	[0.302]	[0.903]	[0.896]	[0.575]	[0.979]
Confident (scale 1–4)	0.202	0.157	0.460	0.273	0.306	0.530
	[0.447]	[0.628]	[0.202]	[0.616]	[0.640]	[0.465]
Certificate I or II	-0.113	-0.265	-1.173	-0.151	-0.284	-1.208
	[0.807]	[0.651]	[0.179]	[0.876]	[0.808]	[0.497]
Certificate III	0.494	0.795	-0.069	0.549	0.829	-0.002
	[0.467]	[0.301]	[0.945]	[0.800]	[0.717]	[1.000]
Certificate IV	0.368	-0.162	-1.119	0.258	-0.258	-1.396
	[0.549]	[0.851]	[0.354]	[0.837]	[0.863]	[0.449]
Certificate – Level unknown	0.465	**1.330**	-0.676	0.528	1.815	-0.520
	[0.412]	[0.034]	[0.467]	[0.677]	[0.201]	[0.742]
Advanced dip./dip. (incl. assoc. dip.)	1.193	**1.438**	1.141	1.182	1.407	1.155
	[0.122]	[0.097]	[0.204]	[0.519]	[0.486]	[0.513]

	Without random effects			With (correlated) random effects		
	Permanent	Casual	Unemployed	Permanent	Casual	Unemployed
Bachelor degree or higher	**1.255**	**1.059**	0.424	1.213	0.915	0.372
	[0.004]	[0.041]	[0.448]	[0.147]	[0.400]	[0.736]
Initial condition (2002) – FT permanent	0.777	0.640	-0.566	1.341	0.952	-0.168
	[0.126]	[0.366]	[0.415]	[0.283]	[0.682]	[0.916]
Initial condition (2002) – PT permanent	**1.534**	1.157	-0.072	2.119	1.422	0.326
	[0.014]	[0.152]	[0.931]	[0.113]	[0.511]	[0.844]
Initial condition (2002) – Casual	-0.003	1.206	-1.676	0.054	3.265	-0.903
	[0.997]	[0.197]	[0.232]	[0.976]	[0.249]	[0.780]
Initial condition (2002) – Unemployed	0.720	0.361	0.926	1.379	1.257	1.651
	[0.227]	[0.671]	[0.212]	[0.358]	[0.619]	[0.397]
1 period lagged status – FT permanent	**2.672**	**1.917**	**1.294**	1.893	1.379	0.587
	[0.000]	[0.012]	[0.052]	[0.111]	[0.617]	[0.667]
1 period lagged status – PT permanent	**1.296**	**1.412**	0.994	0.526	0.915	0.317
	[0.011]	[0.094]	[0.189]	[0.681]	[0.737]	[0.836]
1 period lagged status – Casual	**1.736**	**4.953**	**2.093**	1.582	3.801	1.362
	[0.052]	[0.000]	[0.081]	[0.598]	[0.382]	[0.681]
1 period lagged status – Unemployed	0.913	1.251	0.997	0.326	0.238	0.175
	[0.111]	[0.193]	[0.196]	[0.792]	[0.935]	[0.918]
Standard deviation of random effect (permanent)				1.240		
				[0.150]		
Standard deviation of random effect (casual)				**1.640**		
				[0.002]		
Standard deviation of random effect (unemployed)				1.195		
				[0.246]		
Correlation between random effects (casual, permanent)				0.331		
Correlation between random effects (unemployed, permanent)				0.779		
Correlation between random effects (casual, unemployed)				-0.333		
N (647 individuals * 4 waves)	2588			2588		
Log likelihood	-879.08			-871.73		
Log likelihood (constants only)	-1326.10			-1326.10		
R-squared	0.34			0.34		
R-squared (adjusted)	0.33			0.33		
Degrees of freedom	96			102		

Note: The reference (omitted) categories are: Australian born, parents' occupation class – upper, no post-school qualifications, initial condition (2002) – not in labour force, and 1 period lagged status – not in labour force.

Source: LSAY 1995 cohort.

Table A3 Females: Parameter estimates of (mixed) multinomial logits with and without (correlated) random effects

	Without random effects			With (correlated) random effects		
	Permanent	Casual	Unemployed	Permanent	Casual	Unemployed
Constant	2.176	-2.140	1.492	2.947	-7.573	1.899
	[0.104]	[0.338]	[0.405]	[0.202]	[0.268]	[0.484]
Born overseas	-0.113	0.442	0.038	0.099	0.066	0.176
	[0.758]	[0.400]	[0.944]	[0.863]	[0.966]	[0.813]
Parents' occupation class – Upper-middle	-0.266	-0.267	0.418	-0.274	0.181	0.521
	[0.502]	[0.626]	[0.500]	[0.640]	[0.896]	[0.530]
Parents' occupation class – Lower-middle	-0.050	0.220	0.286	0.080	0.897	0.515
	[0.894]	[0.667]	[0.630]	[0.885]	[0.525]	[0.539]
Parents' occupation class – Lower	-0.303	-0.296	0.676	-0.299	0.128	0.800
	[0.427]	[0.582]	[0.259]	[0.596]	[0.932]	[0.335]
Married or de facto	**-0.862**	-0.226	**-1.163**	**-0.857**	-0.312	**-1.192**
	[0.000]	[0.382]	[0.000]	[0.001]	[0.528]	[0.002]
Ability score reading (on scale of 0–20)	-0.199	0.048	-0.538	-0.300	0.390	-0.610
	[0.235]	[0.867]	[0.015]	[0.314]	[0.696]	[0.112]
Ability score reading – Squared	0.006	-0.004	**0.017**	0.009	-0.017	0.019
	[0.308]	[0.733]	[0.039]	[0.389]	[0.624]	[0.168]
Ability score maths (on scale of 0–20)	-0.164	-0.080	-0.004	-0.144	0.024	0.013
	[0.348]	[0.770]	[0.986]	[0.624]	[0.981]	[0.974]
Ability score maths – Squared	0.009	0.012	0.006	0.009	0.012	0.006
	[0.200]	[0.282]	[0.535]	[0.439]	[0.740]	[0.701]
Agreeable (scale 1–4)	-0.337	-0.062	-0.212	-0.469	0.119	-0.321
	[0.124]	[0.842]	[0.532]	[0.183]	[0.887]	[0.439]
Open (scale 1–4)	0.034	-0.052	0.009	0.047	-0.215	0.033
	[0.833]	[0.830]	[0.973]	[0.854]	[0.772]	[0.928]
Popular (scale 1–4)	-0.065	**-0.664**	-0.352	-0.103	-1.145	-0.356
	[0.733]	[0.027]	[0.232]	[0.748]	[0.247]	[0.472]
Intellectual (scale 1–4)	0.214	**0.557**	0.389	0.294	0.852	0.424
	[0.243]	[0.055]	[0.160]	[0.358]	[0.352]	[0.324]
Calm (scale 1–4)	0.105	0.119	-0.012	0.144	0.013	-0.010
	[0.436]	[0.544]	[0.956]	[0.528]	[0.983]	[0.974]
Hardworking (scale 1–4)	0.085	**-0.429**	0.164	0.129	-1.054	0.235
	[0.581]	[0.072]	[0.479]	[0.581]	[0.191]	[0.534]
Outgoing (scale 1–4)	0.058	-0.010	0.227	0.091	-0.269	0.216
	[0.708]	[0.968]	[0.354]	[0.701]	[0.715]	[0.601]
Confident (scale 1–4)	**-0.442**	**-0.772**	-0.253	**-0.534**	-0.959	-0.269
	[0.005]	[0.001]	[0.308]	[0.029]	[0.199]	[0.423]
Certificate I or II	0.217	-0.044	0.259	0.280	-0.137	0.290
	[0.450]	[0.931]	[0.557]	[0.517]	[0.934]	[0.635]
Certificate III	**0.573**	**0.841**	-0.461	0.774	1.005	-0.346
	[0.056]	[0.069]	[0.414]	[0.126]	[0.507]	[0.671]
Certificate IV	**1.969**	**3.011**	0.112	**2.260**	**4.057**	0.205
	[0.003]	[0.000]	[0.926]	[0.033]	[0.017]	[0.917]
Certificate – Level unknown	0.148	-0.225	0.163	0.175	0.040	0.232
	[0.641]	[0.668]	[0.749]	[0.739]	[0.978]	[0.762]
Advanced dip./dip. (incl. assoc. dip.)	0.311	-0.312	-0.274	0.391	0.316	-0.250
	[0.272]	[0.547]	[0.589]	[0.384]	[0.834]	[0.746]

	Without random effects			With (correlated) random effects		
	Permanent	Casual	Unemployed	Permanent	Casual	Unemployed
Bachelor degree or higher	**1.554**	0.576	0.586	**1.960**	0.091	0.885
	[0.000]	[0.106]	[0.122]	[0.000]	[0.927]	[0.109]
Initial condition (2002) – FT permanent	**1.019**	0.507	-0.257	**2.223**	0.562	0.408
	[0.000]	[0.347]	[0.568]	[0.000]	[0.715]	[0.580]
Initial condition (2002) – PT permanent, or casual	**0.531**	0.747	-0.227	**1.429**	2.177	0.173
	[0.060]	[0.143]	[0.599]	[0.006]	[0.145]	[0.793]
Initial condition (2002) – Unemployed	-0.008	**-2.302**	0.436	0.553	-2.586	0.860
	[0.982]	[0.047]	[0.349]	[0.320]	[0.310]	[0.215]
1 period lagged status – FT permanent	**3.348**	**2.215**	**1.174**	**2.486**	2.625	0.686
	[0.000]	[0.001]	[0.005]	[0.000]	[0.118]	[0.213]
1 period lagged status – PT permanent, or casual	**2.559**	**3.654**	**1.021**	**1.758**	**3.171**	0.622
	[0.000]	[0.000]	[0.018]	[0.000]	[0.056]	[0.288]
1 period lagged status – Unemployed	**1.836**	**1.636**	**1.514**	**1.578**	3.234	**1.228**
	[0.000]	[0.085]	[0.001]	[0.002]	[0.175]	[0.045]
Standard deviation of random effect (permanent)				**1.356**		
				[0.000]		
Standard deviation of random effect (casual)				**3.237**		
				[0.001]		
Standard deviation of random effect (unemployed)				0.759		
				[0.162]		
Correlation between random effects (casual, permanent)				0.077		
Correlation between random effects (unemployed, permanent)				-0.837		
Correlation between random effects (casual, unemployed)				0.480		
N (835 individuals * 4 waves)	3340			3340		
Log likelihood	-1327.73			-1241.18		
Log likelihood (constants only)	-1879.00			-1879.00		
R-squared	0.29			0.34		
R-squared (adjusted)	0.29			0.33		
Degrees of freedom	90			96		

Note: The reference (omitted) categories are: Australian born, parents' occupation class – upper, no post-school qualifications, initial condition (2002) – not in labour force, and 1 period lagged status – not in labour force.

Source: LSAY 1995 cohort.

Table A4 Results from 'what-if' scenarios based on parameter estimates: Personal characteristics (%)

	Specification without random effects				Specification with (correlated) random effects			
Labour market state (dependent variable)	Permanent	Casual	Unemployed	Not in labour force	Permanent	Casual	Unemployed	Not in labour force
Predicted labour market states at observed data values	85.97	5.92	2.68	5.43	83.76	5.94	6.20	4.10
Changes to these base predictions if everyone were:								
Male	1.07	0.72	-0.20	-1.59	1.10	0.91	-0.52	-1.49
Female	-0.41	-0.69	0.21	0.89	-0.51	-0.82	0.50	0.83
Born in Australia	-0.01	0.00	0.02	-0.01	-0.04	0.01	0.03	0.01
Born overseas – Mainly English speaking	-2.18	0.61	-0.04	1.61	-1.44	0.41	0.11	0.93
Born overseas – Non-English speaking	1.73	-0.34	-0.20	-1.19	1.96	-0.39	-0.48	-1.09
Parents' occupation class – Upper	-0.31	-0.55	-0.18	1.04	0.01	-0.67	-0.40	1.06
Parents' occupation class – Upper-middle	0.11	0.05	0.11	-0.26	-0.21	0.23	0.14	-0.16
Parents' occupation class – Lower-middle	0.29	0.39	-0.39	-0.29	0.43	0.54	-0.70	-0.27
Parents' occupation class – Lower	-0.35	-0.52	0.57	0.30	-0.49	-0.86	1.12	0.23
Not cohabitating	0.62	-0.09	0.46	-0.98	0.24	-0.23	0.91	-0.92
Married	-2.95	1.00	-0.78	2.73	-2.83	1.61	-1.55	2.77
De facto	1.00	-0.39	-0.68	0.07	1.95	-0.42	-1.32	-0.21
Ability score reading 10 (on scale of 0–20)	-0.10	0.09	0.23	-0.22	-0.22	0.15	0.42	-0.35
Ability score reading 15 (on scale of 0–20)	-0.01	-0.09	-0.31	0.41	0.10	-0.13	-0.49	0.53
Ability score maths 10 (on scale of 0–20)	0.29	-0.43	-0.18	0.31	0.58	-0.58	-0.34	0.33
Ability score maths 15 (on scale of 0–20)	-0.37	0.35	0.41	-0.39	-0.55	0.47	0.59	-0.51

Source: LSAY 1995 cohort.

Table A5 Results from 'what-if' scenarios based on parameter estimates: Personality (%)

	Specification without random effects				Specification with (correlated) random effects			
Labour market state (dependent variable)	Permanent	Casual	Unemployed	Not in labour force	Permanent	Casual	Unemployed	Not in labour force
Predicted labour market states at observed data values	85.97	5.92	2.68	5.43	83.76	5.94	6.20	4.10
Changes to these base predictions if everyone were:								
Agreeable (most)	1.04	-0.85	0.13	-0.32	1.14	-1.06	0.24	-0.31
Agreeable (least)	-3.58	3.07	-0.33	0.84	-4.02	3.96	-0.74	0.80
Open (most)	-0.46	0.21	-0.09	0.34	-0.43	0.31	-0.22	0.34
Open (least)	1.61	-0.79	0.30	-1.12	1.46	-1.14	0.77	-1.09
Popular (most)	0.76	-0.10	0.09	-0.74	0.78	-0.03	0.10	-0.85
Popular (least)	-1.66	0.19	-0.16	1.63	-1.85	0.03	-0.26	2.08
Intellectual (most)	-0.42	-0.33	-0.09	0.84	-0.50	-0.35	-0.08	0.93
Intellectual (least)	0.52	0.71	0.16	-1.39	0.63	0.74	0.07	-1.43
Calm (most)	-0.65	0.45	-0.04	0.24	-0.82	0.71	-0.10	0.21
Calm (least)	1.53	-1.05	0.08	-0.56	1.84	-1.54	0.20	-0.50
Hardworking (most)	-0.62	0.70	0.05	-0.13	-0.85	0.99	-0.02	-0.12
Hardworking (least)	1.79	-2.06	-0.15	0.42	2.30	-2.62	-0.05	0.37
Outgoing (most)	-0.04	0.22	-0.21	0.02	-0.19	0.50	-0.36	0.04
Outgoing (least)	0.16	-0.70	0.61	-0.06	0.53	-1.47	1.06	-0.12
Confident (most)	0.75	0.38	-0.42	-0.72	1.10	0.27	-0.83	-0.54
Confident (least)	-2.13	-1.00	1.14	1.99	-3.00	-0.74	2.24	1.50

Source: LSAY 1995 cohort.

Table A6 Results from 'what-if' scenarios based on parameter estimates: Qualifications and past labour market status (%)

	Specification without random effects				Specification with (correlated) random effects			
Labour market state (dependent variable)	Permanent	Casual	Unemployed	Not in labour force	Permanent	Casual	Unemployed	Not in labour force
Predicted labour market states at observed data values	85.97	5.92	2.68	5.43	83.76	5.94	6.20	4.10
Changes to these base predictions if everyone were:								
No post-school qualifications	-3.83	0.33	1.20	2.30	-4.46	0.26	2.16	2.04
Certificate I or II	-1.73	-0.81	0.70	1.84	-2.11	-0.97	1.24	1.83
Certificate III	0.05	0.44	-0.85	0.36	0.87	0.34	-1.52	0.31
Certificate IV	2.07	1.34	-1.74	-1.67	2.43	2.34	-3.69	-1.08
Certificate – Level unknown	-3.70	2.49	0.07	1.14	-4.72	3.87	-0.16	1.01
Advanced dip./ dip. (includes assoc. dip.)	-0.80	-0.33	0.50	0.63	-1.40	-0.20	1.01	0.58
Bachelor degree or higher	4.06	-0.91	-0.60	-2.55	4.44	-1.23	-1.01	-2.20
1 period lagged status – Not in labour force	-25.40	-3.15	3.43	25.11	-10.32	-2.72	4.32	8.71
1 period lagged status – FT permanent	8.03	-3.73	-1.10	-3.20	4.52	-1.65	-1.22	-1.65
1 period lagged status – PT permanent	2.42	-2.15	0.46	-0.72	-1.54	-0.22	1.50	0.26
1 period lagged status – Casual	-45.45	47.81	-0.32	-2.03	-13.34	14.88	-0.12	-1.42
1 period lagged status – Unemployed	-6.05	-1.51	4.53	3.03	-4.81	-0.82	5.41	0.23
Initial condition (2002) – Not in labour force	-5.65	0.67	2.68	2.30	-11.94	0.30	6.15	5.49
Initial condition (2002) – FT permanent	3.01	-0.98	-1.03	-1.00	4.85	-2.00	-1.54	-1.31
Initial condition (2002) – PT permanent	0.83	0.03	-0.58	-0.28	1.95	-0.66	-0.60	-0.69
Initial condition (2002) – Casual	-5.43	5.13	-1.73	2.02	-23.42	25.18	-4.41	2.65
Initial condition (2002) – Unemployed	-4.42	-1.82	4.06	2.17	-7.88	-2.93	8.68	2.13

Source: LSAY 1995 cohort.

Table A7 Results from 'what-if' scenarios based on parameter estimates: Qualifications and (select) past labour market status – combined (%)

Labour market state (dependent variable)	Specification without random effects				Specification with (correlated) random effects			
	Permanent	Casual	Unemployed	Not in labour force	Permanent	Casual	Unemployed	Not in labour force
Predicted labour market states at observed data values	85.97	5.92	2.68	5.43	83.76	5.94	6.20	4.10
Changes to these base predictions if everyone were:								
1 period lagged status – Not in labour force *AND*								
No post-school qualifications	-39.16	-3.34	5.13	37.37	-19.01	-2.89	6.75	15.15
Certificate I or II	-35.64	-4.07	4.31	35.40	-16.27	-3.65	5.40	14.53
Certificate III	-27.29	-2.81	1.43	28.67	-9.51	-2.47	1.71	10.27
Certificate IV	-15.73	-1.39	-0.34	17.46	-3.97	-0.48	-1.57	6.01
Certificate – Level unknown	-34.49	-1.19	3.21	32.47	-16.32	0.00	3.83	12.50
Advanced dip. /dip. (includes assoc. dip.)	-30.60	-3.57	4.32	29.85	-13.55	-3.00	5.59	10.97
Bachelor degree or higher	-11.30	-3.54	2.69	12.14	-2.18	-3.34	3.32	2.19
1 period lagged status – Unemployed *AND*								
No post-school qualifications	-14.28	-1.26	7.78	7.75	-10.99	-0.77	9.07	2.69
Certificate I or II	-10.67	-2.64	6.48	6.83	-8.07	-1.98	7.56	2.50
Certificate III	-5.30	-0.87	2.29	3.87	-3.18	-0.35	2.80	0.72
Certificate IV	-0.37	0.60	-0.19	-0.05	-0.07	2.22	-1.21	-0.94
Certificate – Level unknown	-12.19	2.04	4.74	5.41	-10.04	3.40	5.17	1.48
Advanced dip./dip. (includes assoc. dip.)	-8.29	-2.01	5.90	4.39	-6.97	-1.13	7.14	0.96
Bachelor degree or higher	1.38	-2.61	2.76	-1.53	0.76	-2.03	3.52	-2.25
1 period lagged status – Casual *AND*								
No post-school qualifications	-51.23	50.78	0.63	-0.18	-18.42	16.13	2.04	0.25
Certificate I or II	-42.95	42.01	0.69	0.25	-13.89	12.04	1.57	0.29
Certificate III	-48.96	52.17	-1.22	-1.98	-13.25	16.31	-1.82	-1.25
Certificate IV	-52.19	57.99	-2.06	-3.74	-15.23	21.93	-4.21	-2.50
Certificate – Level unknown	-59.95	63.21	-0.97	-2.29	-23.96	26.33	-1.26	-1.11
Advanced dip./dip. (includes assoc. dip.)	-45.13	46.16	0.23	-1.25	-14.64	14.60	0.94	-0.90
Bachelor degree or higher	-37.04	41.51	-0.76	-3.71	-6.95	10.97	-1.07	-2.95

Source: LSAY 1995 cohort.

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