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Abstract

This study explores the relation between a worker's job duration and prior labour market experience. Hazard models are estimated using data on employment spells for the population aged 25 to 64 years in Australia from the HILDA survey (waves 1 to 7). A worker's labour force state immediately preceding an employment spell is found to have a significant effect on the likelihood of exit from employment, as well as the exit destination and whether the exit is involuntary. In particular, previously being unemployed or having experienced involuntary separation from a job is associated with worse subsequent employment outcomes. To develop further insights into the role of labour market history a hazard model for exit from unemployment is also estimated, and the results contrasted with those from the employment model.

JEL-Classification: J20, J60, J64

Keywords: unemployment, job tenure, hazard rate

1. Introduction

This study examines how job duration is affected by a worker's labour market history; in particular having spent time unemployed. We estimate a hazard model for exit from employment, and seek to identify the effect of labour market history by, for example, comparing workers who have shifted into new jobs from different labour force states. The sample of employment spells is drawn from longitudinal data on individual-level labour market outcomes for 2001 to 2007 from the Household, Income and Labour Dynamics in Australia (HILDA) survey (waves 1 to 7).

Considerable effort has been devoted in Australia over the past decade to shifting unemployed persons off welfare payments and into employment. To a large degree the success of such a policy approach is contingent on the quality of jobs gained by the unemployed. One important aspect of job quality is how long the job lasts. The extent of improvement in well-being for those unemployed who shift into employment will depend significantly on the duration of the jobs they obtain. The size of gain in household income, the growth in skill development and scope for residential stability, are all likely to be affected by the length of time spent in employment.

To examine the determinants of job duration a discrete-time proportional hazard model for exit from employment is estimated for a sample of the Australian population aged 25 to 64 years. A competing risks framework is used to separately examine exits to unemployment and to other labour market states, and to involuntary separation compared to voluntary separation. Employment spells are distinguished by a worker's labour market state prior to entry to the new job and by labour market experience. This approach primarily follows the analysis of job duration in the United Kingdom undertaken by Boheim and Taylor (2002). As a way of benchmarking our analysis against existing Australian literature, we also estimate a hazard model for exit from unemployment. Both hazard models use a complementary log-log specification, with the baseline hazard as a piecewise function, and unobserved individual heterogeneity (random effects) assumed to be drawn from a normal distribution.

There has been a variety of research in Australia on the consequences of unemployment, such as effects on well-being (for example, Carroll, 2007). However, little of this analysis has been about how unemployment affects subsequent labour market outcomes,

such as job duration. Most closely related to this study is research by Doiron and Gorgens (2008) which estimates a dynamic event history model to investigate state dependence in the Australian labour market for young Australians with no post-school education. With this approach it is possible for example to recover transition intensities which describe patterns of transition between labour force states by elapsed time in the current labour force state.

Other studies that investigate state dependence - Knights et al. (2002), Le and Miller (2001), and Buddelmeyer et al. (2009) - estimate dynamic models for the determinants of current labour force status with alternative sets of variables to proxy for labour market history. For example, Buddelmeyer et al. (2009) investigate how the probability of unemployment in the current time period is affected by being unemployed, in a low-paid job, or in a high-paid job, in the preceding time period. Another set of studies has examined 'churning' off and onto unemployment payments. Richardson (2003) examines the timing of return to unemployment payments for samples of unemployment payment recipients who have moved off payments, with particular attention to whether there are differences between those who have and have not participated in an active labour market program. Tseng et al. (2008) provide a general overview of patterns of churning off and onto welfare payments. A final related area of research is on the re-employment experiences of displaced workers in Australia. A survey of case studies of episodes of worker displacement by Borland (1998), and a comparative study of effects of displacement in Australia and UK by Borland et al. (2002), provide evidence on scarring effects of unemployment.[1]

There is a more extensive literature on determinants of duration of unemployment spells. A large number of studies have also estimated hazard models for exit from unemployment. Carroll (2006) is a recent study which estimates a hazard model using calendar data on labour force states for 2001 and 2002, and Vu (2010) estimates a hazard model for exit from unemployment payments using annual data for 2001 to 2006. Both studies use data from the HILDA survey.[2] Other research, by Chalmers and Kalb (2001) and Buddelmeyer and Wooden (2008), compares the subsequent likelihood of obtaining permanent employment for unemployed persons and persons with casual jobs. Much of the research on state dependence and churning described above also addresses this issue.

Our main original contribution is to examine how a worker's labour market history affects job duration for the working age population in Australia. Using a sample of employment spells for the working age population allows a broader analysis of the effects of labour market history on job quality than in earlier studies which, for example, have been restricted to samples of younger workers or welfare payment recipients. The hazard model approach means we are also able to say more about the duration of employment spells and how exit from employment occurs than previous studies. Having a focus on transitions from employment does limit our study compared to Doiron and Gorgens (2008) who examine patterns of transition between employment, unemployment and being out of the labour force. However, by having that focus it is possible to provide a more integrated and (in some regards) more detailed analysis of how labour market experience affects the duration of, and exit destinations from, employment spells. Like Doiron and Gorgens (2008) we attach considerable importance to distinguishing between alternative aspects of labour market history that might affect subsequent employment experience. The other main contribution of our study is estimation of a hazard model for exit from unemployment using HILDA calendar survey data from a much longer sample period than Carroll (2006), and which we are then able to compare with the employment hazard model.

Section 2 describes the construction of the data set from the HILDA survey for our study and presents descriptive statistics. Section 3 describes the empirical method. Sections 4 and 5 respectively present results on the hazard models for exit from employment and unemployment. Section 6 summarises the main findings and makes a comparison with previous studies. Section 7 provides concluding remarks.

2. Data and descriptive statistics

Data are from waves 1 to 7 of the Household, Income and Labour Dynamics in Australia (HILDA) survey. HILDA is a household-based longitudinal study that is nationally-representative with the exception of under-sampling individuals living in more remote areas of Australia. It began in 2001 with the survey of 13,969 persons in 7,682 households, and each year since interviews have been conducted between September and December with all willing members of each household who are at least 15 years old at the time of the interview.

At each HILDA interview, respondents are asked questions relating to current labour force status, household composition, individual demographics and income.[3] Respondents are also asked questions regarding their most recently terminated job, if different from the job held during the last interview. Most importantly for our purposes, respondents are requested in each interview to report their labour force state in a calendar for every third of a month over the past eighteen months. Labour force states are classified as being: enrolled in school or any course of study; employed; not employed but looking for work; or not employed and not looking for work. It is these calendar data that we use to construct measures of unemployment and employment spells.

The sample in this study is respondents aged between 25 and 64 years who are observed to have a valid employment or unemployment spell, and who have non-missing covariate values. Attention is restricted to persons aged over 25 years in order to focus on a population that is likely to be fully engaged in the labour market. This avoids for example including full-time students in the sample, whose employment experience is likely to differ from persons whose main activity is work or seeking work.

We analyse a person's first spell of employment that lasts at least one month and that begins after their wave 1 interview. Employment spells with duration of less than one month are ignored in order to minimise measurement error arising from recall bias. This implies that an employment spell must have a minimum duration of one month to be included in our sample, and only ends when the person is in another labour force state for at least one month. Any employment spells beginning before the wave 1 interview are discarded. This ensures that we observe the start date of the employment spell, that we observe the preceding spell type, and that the person's demographic and economic information is measured before the spell begins. An additional restriction is that the spell is on-going at an interview date. This is an important restriction, because it makes certain that we observe detailed information regarding the spell under analysis *and* the preceding spell. Though the beginning and end date of each job is recorded, information regarding job characteristics is only collected for jobs held at interview dates and for the most recently preceding job. There are 3044 employment spells that satisfy these criteria.

The sample of unemployment spells is constructed in a similar manner. We analyse respondents' first unemployment spell that lasts at least one month and that begins after their wave 1 interview. For unemployment spells however it is not necessary to impose the restriction that the spell should be on-going at the interview date. There are 1859 unemployment spells that satisfy these criteria.

A potential problem with using the HILDA calendar data is that some measurement error appears to exist, most likely due to recall bias. The calendar in each survey extends back 18 months (apart from wave 1, which has a 12 month calendar), and so each pair of adjacent waves of the survey has an overlap between calendars of six months. It is thus possible to compare information recorded for those months to establish consistency of respondents' recall. The most pervasive type of recall bias appears to be where spells which were initially classified by respondents as unemployment (that is, not employed but looking for work), are then redefined in the calendar in the next survey as inactivity (that is, not employed and not looking for work). A consequence of this recall bias is that a higher than expected proportion of persons exit from unemployment spells to inactivity at interview dates. It does appear however that respondents more accurately recall the commencement of employment. Therefore, the end dates of unemployment spells where respondents exit to employment are more uniformly distributed across the calendar year.[4] If overlapping calendar data from adjacent surveys are inconsistent, we use data from the earlier survey, which requires respondents to recall their activities in the preceding 6 months, rather than the later survey, which requires respondents to recall their activities 12 to 18 months ago. The effect of recall bias is also minimised as our focus will be on unemployment spells which end in employment, with unemployment spells ending in inactivity or school treated as right-censored.

Descriptive information on the samples of employment and unemployment spells is presented in Table 1.[5] Entrants to new employment spells come roughly one-half from employment, one-quarter from unemployment, one-sixth from inactivity, and the remainder from school. About one-quarter of employment spells end with a shift to a new job, under 10 per cent are completed with exits to each of unemployment and inactivity, and over one-half are right-censored. Completed average employment spell durations are quite similar – about 18 to 19 months - between workers entering employment from, and exiting to, different labour force states.

Entrants to unemployment spells come about one-half from employment, one-third from inactivity, and the remainder from school. Those entering from inactivity have completed unemployment spells that are on average about 5 months, compared to 4 months for those who enter from employment or schooling. About two-thirds of exits from unemployment are to employment, with the remainder of exits being evenly divided between other labour force destinations and right-censoring. Those who exit to inactivity have average unemployment spell durations of just over 6 months, whereas for those exiting to schooling or employment the average spell length is 3 to 4 months.

Table 2 provides further information on the duration of employment spells disaggregated by exit destination. For the sample of 'all exits' about 90 per cent of employment spells survive till six months, almost 80 per cent till 1 year, and almost 60 per cent for 2 years. There are however quite large differences in survival rates to the alternative exit destinations. Survival rates of employment spells that exit to unemployment are much lower than for alternative labour force exit destinations, and survival rates for exit that involves involuntary separation are lower than for voluntary separation. [6]

3. Empirical model

The impacts that spell length and individual-level characteristics have on the duration of employment and unemployment spells are estimated using a discrete-time proportional hazard regression model. The dependent variable in this model is the hazard rate, which is defined as the conditional probability that person *i* exits a state during month-third *t*, conditional on having survived in that state until the end of month-third $t-1$. We parameterise the hazard rate using the complementary log-log specification:

$$(1) \qquad h_{it} = 1 - \exp[-\exp(\beta' x_i + \gamma_t + \log(\varepsilon_i)]$$

where x_i is a vector of time invariant covariates. The parameters to be estimated are the elements in the coefficient vector β, and in the vector γ_t which is the baseline hazard. The ε_i term represents unobserved individual heterogeneity (random effects) and is assumed to be drawn from the normal distribution. [7]

We specify the baseline hazard as a piecewise linear function. Time is partitioned into intervals and it is assumed that the hazard rate is constant within each interval, but not necessarily between intervals. An advantage in using the piecewise baseline hazard, compared with a parametric alternative, is that the shape of the hazard function does not need to be imposed in advance and need not vary monotonically with elapsed time.

The lengths of the time intervals in the baseline hazard are chosen to ensure that there are a sufficient number of exits per interval in all model specifications. Consequently, the following 9 month-third intervals (each corresponding to a 6 month period) are used in the employment spell models, where the figures in parentheses are the number of exits to all labour force states: 1-18 (208), 19-36 (313), 37-54 (272), 55-72 (177), 73-90 (130), 91-108 (79), 109-126 (63), 127-144 (41), 145+ (65). Similarly, the following 16 intervals are used in the unemployment spell models: 1 (249), 2 (155), 3 (108), 4 (127), 5 (83), 6 (72), 7 (87), 8 (54), 9 (47), 10-12 (130), 13-15 (108), 16-18 (79), 19-27 (157), 28-36 (93), 37-54 (52), 55+ (48).

The independent competing risks framework is used to estimate alternative models. For exits from employment three models are specified. One estimates a single risk of the employment spell ending, a second treats exits from employment to unemployment and to other labour force destinations as competing risks, and a third treats exits to due to involuntary separation and for other reasons as competing risks. To estimate the hazard models for exit from employment, exits to other destinations in the second model, and voluntary exits in the third model, are treated as right-censored spells. For exits from unemployment two models are specified. One estimates a single risk of the unemployment spell ending, and the other treats exits from unemployment to employment and to either school or inactivity as competing risks.

In the independent competing risks framework, it is assumed that the arrival times associated with each potential exit are independent. This assumption would be violated if, for example, workers are more likely to voluntarily quit their job if informed that they are to be fired. However, recent evidence suggests that that the conditional exit probabilities from unemployment to employment and non-participation are uncorrelated across individuals (see van den Berg et al., 2008).

In each model we represent labour market history using variables for: (i) Labour force state prior to current spell; and (ii) Proportion of time after completion of schooling spent in each labour force state. In the employment hazard model we also include a measure of experience in current occupation to capture effect of occupation-specific human capital. Information on (i) is from the calendar data; and on (ii) and occupation-specific experience is from questions asking respondents retrospectively about their experiences in the labour market.

In their analysis of effects of labour market experience on subsequent employment and unemployment outcomes Heckman and Borjas (1980) distinguish between duration dependence, lagged duration dependence, and occurrence dependence. To explain these concepts, take the example of a person currently in an employment spell. Duration dependence refers to the effect of the duration of the current employment spell on the likelihood of exiting that spell. Lagged duration dependence describes how the length of previous spells in employment and unemployment affect the likelihood of exiting the current spell of employment. Occurrence dependence is where the numbers of previous episodes of employment and unemployment affect the likelihood of exiting the current employment spell.

In this study we are able to test (at least partly) for each of these effects. Analysis of the baseline hazard allows us to examine duration dependence. Including an explanatory variable for the proportion of time spent in alternative labour force states introduces a potential role for lagged duration dependence. By including the labour force state prior to the current spell we also have a partial measure of occurrence dependence.[8] With a relatively rich set of other explanatory variables, and controlling for unobserved heterogeneity, our interpretation of these effects will be that they represent 'true' duration or occurrence dependence, rather than proxying for respondents' demographic or job characteristics.

We also include other explanatory variables. Both models for employment and unemployment include variables for gender, age, marital status, number of children, geographic region of residence, country of birth, English-speaking ability, education attainment, and health status. In the employment hazard model a variety of descriptors for job characteristics are also included – hours of work, casual/permanent status, sector,

union membership, size of firm, and occupation. Information on all explanatory variables is from the interview date immediately prior to spell commencement.

4. Exit from employment

Results for hazard models for exit from employment are shown in Table 3 and Figure 1. Table 3 presents results from models for all exits, and competing risks models that distinguish between exits to unemployment and other labour force destinations, and between involuntary and voluntary separations. Figure 1 shows the baseline hazard rate for exit from employment (calculated for mean covariate values).

Our results show that labour market history affects the likelihood of ending an employment spell. First, there is evidence of some positive duration dependence over the first year of an employment spell, after which the baseline hazard remains relatively constant. Second, a worker's labour force state prior to the employment spell is an important determinant of spell length. Having been in schooling or making an involuntary transition from a job immediately prior to the current employment spell raise the likelihood of exit from employment compared to having made a voluntary job-to-job transition. For example, entering a new job after involuntary separation from a previous job raises the likelihood of exit by over 30 per cent. These labour force histories also raise the likelihood of exit through involuntary separation, but not of exit to unemployment. Having been unemployed raises the likelihood of exit from an employment spell to unemployment and of exit due to involuntary separation; and the overall effect on exit is also negative, although only significant at the 10% level. Having been inactive prior to taking a job does not affect the overall rate of exit or the rate of exit to unemployment, but is associated with higher incidence of involuntary separation. Third, lagged duration dependence does not appear to matter for employment spell duration. Differences in the proportions of time spent in alternative labour force states do not have significant effects on exit from employment – either overall, or in determining the type or destination of exit. Similarly, cumulative occupation-specific experience does not have significant effect on exit from employment.

Unobserved heterogeneity appears to play an important role in explaining exits from employment. In two models unobserved heterogeneity is significant at the 5% level, and in the other at the 10% level. In the models for exit to unemployment and exit to

involuntary separation, unobserved heterogeneity is estimated to explain a substantial proportion of variation in exit rates.

We have sought to investigate possible sources of heterogeneity by examining variation in the effects of labour market history. Some findings from these models are reported in Table 4. We take the basic model from Table 3 and add interaction effects between previous labour force state being unemployment and the proportion of time since entering the labour market spent unemployed, and dummy variables for gender, age less than 35 years, and high-school drop-out. There is some evidence of differences by gender in the effect of having been unemployed immediately prior to the current employment spell. However, heterogeneity in effects of labour market history by other characteristics is not apparent.

Based on these findings, separate models for exit from employment were estimated by gender to allow the impact of gender to be explored further. The main findings from these models are reported in Table 5. Most importantly, labour market history is shown to play a stronger role in explaining the overall likelihood of exit for males than females. Entering employment from unemployment or involuntary separation significantly raises the rate of exit from employment for males; and interestingly there is now a significant positive effect of time spent out of the labour force on the rate of exit. In contrast, none of the labour market history variables significantly affect exit from employment for females. The results for exit to unemployment and exit by involuntary separation are more similar between males and females, and to results from the pooled gender model. Having been unemployed raises the likelihood of exiting to unemployment, and entry to employment from both unemployment and involuntary separation increase the likelihood of involuntary separation from the current job. Time spent in different labour force states is not significantly related to exit in these models for either gender; however, females with more experience in their current occupation have a slightly lower likelihood of exiting to unemployment.

Returning to the main models (Table 3), of the other included explanatory variables, job characteristics are significantly related to the rate of exit from employment and have quite large effects. Primarily, being employed on a casual contract has a large positive effect on the overall likelihood of exit from employment, as well as on the rate of exit to unemployment, and the incidence of involuntary separation. The effect on the overall

rate of exit is to raise the likelihood of the job ending in each period by almost 80 per cent. Being in a public sector job or a union member lower the overall likelihood of exit from employment; and being in a small firm raises this likelihood by a small amount.

The characteristics of individual workers do not seem to be as strongly related to exit from employment. Older workers are less likely to exit employment spells, as are married workers, and those living in a regional area. Having a limiting illness raises the likelihood of exit. One striking result is that in none of the models are any of the individual education effects significantly related to likelihood of exit from employment.

5. Exit from unemployment

Results from hazard models for exit from unemployment are reported in Table 6 and in Figure 2. Table 6 shows hazard ratio estimates for a model for all exits, and the competing risks model of exit to employment and school/inactivity. Figure 2 shows the estimated baseline hazard rate for exit from unemployment to employment (calculated using mean covariate values).

Labour market history is shown to matter for subsequent labour market outcomes in variety of ways. First, the hazard from unemployment primarily exhibits negative duration dependence. This is quite similar to the pattern found by Carroll (2006). Second, the previous labour force state has a significant effect on unemployment spell duration. Persons whose previous labour force state was school or inactivity are less likely to exit unemployment to employment than persons whose previous state was employment; however they are more likely to exit unemployment to school or inactivity. Overall, having been in inactivity lowers the rate of exit from unemployment, but there is no significant effect from previous labour force state being schooling. Third, lagged duration dependence affects unemployment spell duration. A higher proportion of time since entering the labour force spent unemployed or out of the labour force lowers the likelihood of exiting unemployment, and exiting unemployment to employment, but is not significantly related to exit to schooling or inactivity.

The results suggest that unobserved individual heterogeneity is somewhat important in explaining exit rates from unemployment, especially exits from unemployment to schooling or inactivity. In the model for exits to schooling or inactivity a likelihood ratio

test indicates that unobserved heterogeneity is highly significant (p-value equals 0.007). In contrast, unobserved heterogeneity is insignificant in the model for exits to employment.

A range of other explanatory variables are related to exit from unemployment. Being older is associated with progressively lower likelihoods of exiting unemployment, and exiting to employment. For example, those who are aged 50 years and above are only about one-half as likely as those aged 25 to 29 years to exit unemployment in any period. Being married raises the likelihood of exit from unemployment. Living in a rural or regional reduces the overall rate of exit and the rate of exit to employment. Immigrant status also lowers the likelihood of exit from unemployment and exit to employment, with larger negative effects for those from non-English speaking countries; however there is no effect on exit to schooling or inactivity. Compared to not completing high school, having higher levels of education attainment (and especially a university degree) has a positive effect on the likelihood of exit from unemployment, and exit to both alternative destinations. Completing high school or having a certificate or diploma all raise the rate of exit from unemployment by similar magnitudes, about 20 per cent, and having a university degree raises the rate of exit by about 70 per cent. The effects are less significant for exit to schooling or inactivity than for exit to employment. Having a limiting illness lowers the rate of exit from unemployment and the rate of exit from unemployment to employment.

6. Summary of findings and discussion

First, the main effect of labour market history on job duration appears to come from a worker's labour force state immediately prior to an employment spell. Having been unemployed before an employment spell is associated with shorter job duration. Those who enter employment from unemployment are more likely to exit employment, and that exit is more likely to be involuntary and to be to unemployment. Having been in school or undertaken an involuntary job-to-job transition are also associated with shorter job duration, and a higher incidence of involuntary separation, but no significant effect on exit destination. Hence having been unemployed, in schooling or making an involuntary job-to-job transition seem to disadvantage a worker in keeping a job; but only unemployment affects the probability of then being able to make an immediate transition to a new job. Having been inactive prior to taking a job does not affect job

duration or exit destination, but does raise the likelihood that the job will end through involuntary separation. Second, other aspects of labour market history have less or no effect on job duration. Once the length of an employment spell reaches more than a year, having spent a longer time in a job does not have a large effect on the likelihood of the job ending. The length of time spent in alternative labour force states prior to the current job matters for job duration. A third main finding is that there are some differences by gender in the effect of labour market history. In particular, having been unemployed or having had an involuntary job separation immediately before an employment spell has a far greater negative effect on employment spell duration for men than for women. There are not, however, substantial differences in the effect of labour market history for other demographic characteristics. Finally, job characteristics seem to matter more than demographic characteristics as a determinant of the rate of exit and of exit destination.

The results in our study on the effects of labour market history can be compared to those in the similar analysis for the UK by Boheim and Taylor (2002). Both studies find a significant difference in job duration between jobs entered through alternative routes such as voluntary separation from a previous job or unemployment. The studies also have in common the finding of different effects on exit destination and type of separation – for example, that persons who enter a job after a spell of unemployment are more likely to exit that job due to involuntary separation and to move to unemployment. However, Boheim and Taylor find stronger evidence of effects of lagged duration dependence. In this regard our results are closer to the patterns of labour force dynamics in the youth labour market in Australia found by Doiron and Gorgens (2008). One of the main results from their analysis is that the numbers of previous episodes in each labour force state have a significant effect on labour market transitions, but that the cumulative duration spent in those states does not affect transitions. Finally, our study is similar to Boheim and Taylor in finding that job characteristics are important in explaining job duration; although evidence of effects of workers' demographic characteristics on job duration is much weaker in our study.

In analysis of unemployment spells we also found that labour market history matters for exit patterns. Having been in school or inactive prior to an unemployment spell lowers the likelihood of exit to employment and raises the likelihood of exit to schooling or inactivity compared to a person whose previous labour force state was employment. A

longer proportion of time spent unemployed or out of the labour force substantially lowers the likelihood of exit to employment, but does not have a significant effect on exit to schooling or inactivity. Hence there is a large negative effect on the overall likelihood of exiting unemployment to employment. The other aspect of the results on labour market history is the strong evidence of negative duration dependence.

These results on exit from unemployment are broadly similar to those of Carroll (2006), which is the study most closely related to our analysis, and to Vu (2009). Similar to Carroll (2006) we find evidence of negative duration dependence, and of a significant effect of time spent in previous labour force states on the rate of exit. Vu (2009) also finds negative duration dependence, as well as a significantly higher likelihood of exiting unemployment where a spell of employment had immediately preceded the unemployment spell. All studies find an important role for factors such as education attainment, marital status, disability, and immigrant status.

Taken as a whole, the findings from our study suggest a variety of new insights into how labour markets in Australia work. Our main result is to show the importance of a worker's prior labour force state for the quality of job they obtain. Differences in job duration between workers who have shifted into employment from different labour force states, indicate that unemployment, inactivity and employment must be regarded as distinct labour force states. This is reinforced by the analysis of exit destinations – with the finding that while those who shift to employment from unemployment and from an involuntary job separation both experience relatively shorter job durations, those who were unemployed are more likely to exit to unemployment than those who experienced involuntary job loss.

An explanation for why prior labour force state matters for job duration could be that labour market history is determining the type of job available to workers commencing new jobs. First, information networks may be such that people who have been unemployed are less likely to obtain information about available job vacancies, and when they do, the jobs are low quality; whereas people who shift from inactivity or who are already employed may have networks that provide them with information about more, and higher quality, jobs (see for example, Rees, 1966, and Wilson, 1987). Second, workers who have had an involuntary separation from their previous job for financial reasons may take less time to search for a new job than those who are able to

separate voluntarily from their previous job. The smaller amount of time spent in job search is then reflected in a lower quality of new job. This explanation also seems consistent with the finding that a workers' prior labour market status matters more for men that for women. For example, to the extent that females are more likely to be the secondary income-earner in a household, they may be able to take more time in job search when not in employment, and hence enter higher quality jobs than males in the same position. The data seem to be consistent this hypothesis: as an example, for the sample of HILDA respondents who had an involuntary job separation in the past 12 months, women are 7 percentage points less likely to be currently employed than men. This suggests that women may be able to spend longer in job search than males. That workers who have shifted from schooling to employment have shorter job durations seems most likely to be explained by them being in a phase of seeking to find a good job match.

Another important finding concerns 'the dog that did not bark'; that is, the absence of an effect on job duration from the proportion of time spent in different labour force states since a worker entered the labour force. This contrasts with the unemployment hazard model where that aspect of labour market history does matter. A possible explanation for these results is that whereas the information content of a person's labour market history is relevant for an employer deciding whether to offer them a job, once a person has a job it is not relevant to how long the job will last. Suppose that the longer amount of time a person spends unemployed causes a greater atrophy of skills or lack of job-readiness. Then an employer may use the length of time a job applicant has spent unemployed as a way of evaluating whether they have appropriate skills for the job. However, having decided a worker has the appropriate level of skills for a job, and having hired that worker, it is less likely the employer would base a decision on how long to keep the worker on that same information.

The final result that is worth investigating is the important role of job characteristics versus worker demographic and skill characteristics in explaining job duration. The most likely explanation for why we find a stronger role for job characteristics than previous studies is that we are able to include a richer set of controls for job characteristics. This finding suggests that a worker's demographic and skill characteristics mainly determine the type of job that a worker obtains. It is then the type of job, or job characteristics, that have a direct effect on job duration.

7. Conclusion

Does labour market history matter for explaining the duration of employment and unemployment spells of labour force participants? The answer from this study is yes. The likelihood of exit from employment, as well as the exit destination and type of exit, are all significantly related to a worker's labour force status immediately preceding the employment spell, especially for males. Similarly, exit from unemployment depends on labour force status in the preceding spell, and also on the length of time spent in alternative labour market states since entering the labour market. In addition, the length of the current spell of employment or unemployment appears to play some role in explaining the completed length of those spells.

That labour market history is an important determinant of the duration of employment and unemployment spells has implications for thinking about how the labour market operates. One suggested interpretation of our results is that the quality of job vacancies which any job-seeker is aware of or able to apply for will be related to their information network, and that information network will depend on their current labour force state. The importance of labour market history also has implications for public policy. Whatever the explanation for the effect of labour market history, it suggests that policy-makers, concerned with achieving an improvement in well-being for unemployed job-seekers, need to have regard to the issue of job quality. A job is not a job. Obtaining employment is not likely to be the end of disadvantage for many people who have been unemployed.

Endnotes

1. International literature on effects of unemployment on subsequent labour market experience that has also followed approaches of modelling state dependence on labour market outcomes, analysis of more general scarring effects of unemployment, and studying quality of post-unemployment jobs for unemployment payment recipients and ALMP participants. For partial surveys see respectively Boheim and Taylor (2002), Dorion and Gorgens (2008), and Borland et al. (2010).

2. Borland (2000) reviews early studies.

3. For more details see Watson and Wooden (2004).

4. See Appendix Figures A1 and A2.

5. Descriptive statistics on unemployment and employment spell samples are in Appendix Table A1.

6. We follow Boheim and Taylor (2002) in defining involuntary separations as dismissals/retrenchments and the ending of temporary jobs, and defining all other separations as voluntary (for example, obtained better job, illness, pregnancy, returning to study).

7. Analysis was also undertaken with a model with random effects drawn from a discrete multinomial distribution (see Heckman and Singer, 1984). Results using this approach were close in value to those using the gamma distribution. This suggests that the results are not sensitive to the choice of distribution for the random effects.

8. Our analysis of occurrence dependence is more limited than Doiron and Gorgens (2008) who include variables for the number of previous spells in each labour force state. Information necessary to construct these variables is not available from HILDA as we do not observe the history of each respondent since entering the labour market. Compared to Boheim and Taylor (2002) we are not able to include information on the duration of the previous spell. This is due to left-censoring of calendar information on those previous spells. But as noted, we do include variables for the proportion of time spent in alternative labour force states since entering the labour force. We also extend both these studies by testing a variable for occupation-specific experience.

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Figure 1: Predicted Hazard Rates of Employment Spells

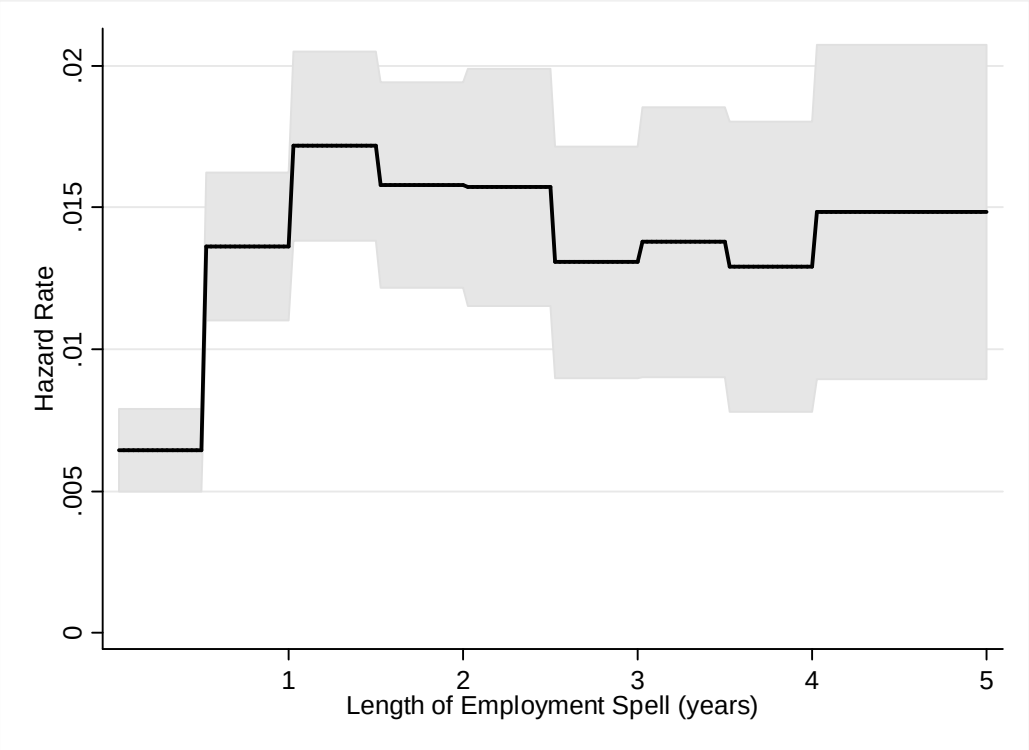

Figure 2: Predicted Hazard Rates of Unemployment Spells ending in Employment

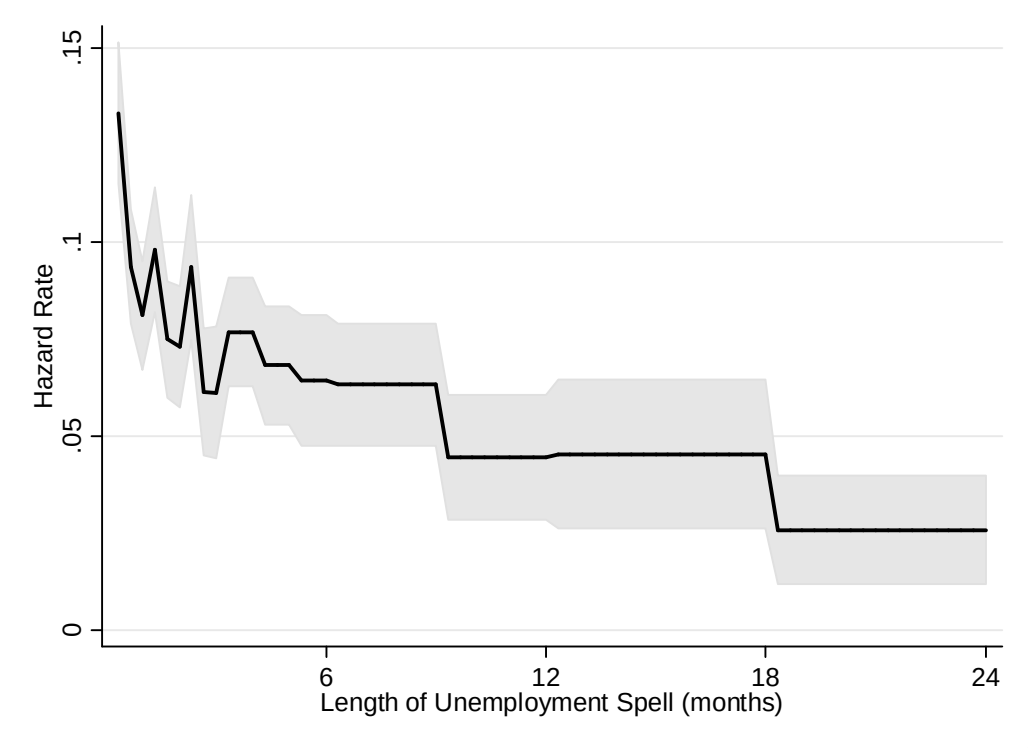

Table 1: Frequency and Duration of Spells by Entering and Exit Labour Force States

	Unemployment Spells		Employment Spells	
	Percentage	Mean Duration	Percentage	Mean Duration
Labour Force State Before Spell				
Employment	56.43	11.42	58.38	55.55
Unemployment	-	-	22.11	57.03
School	8.12	11.55	3.06	52.21
Economic inactivity	35.45	14.62	16.46	60.04
Labour Force State After Spell				
Employment	67.03	10.73	26.28	57.28
Unemployment	-	-	7.23	54.94
School	4.73	15.07	1.38	53.81
Economic inactivity	16.94	18.80	9.40	55.97
Censored	11.30	20.74	55.72	73.50
Number of individuals	1859		3044	

Note: Mean durations are in month-thirds. The censored category refers to unemployment and employment spells that are right-censored.

Table 2: Employment Survivor Function Estimates by Exiting Labour Force States

Duration in months	All exits	Exit to Unemployment	Involuntary Separation
1	0.995	0.991	0.991
	(0.001)	(0.006)	(0.005)
3	0.976	0.941	0.946
	(0.003)	(0.016)	(0.013)
6	0.925	0.814	0.797
	(0.005)	(0.026)	(0.022)
12	0.798	0.586	0.582
	(0.008)	(0.033)	(0.027)
18	0.675	0.373	0.355
	(0.010)	(0.033)	(0.026)
24	0.585	0.286	0.246
	(0.010)	(0.031)	(0.024)
36	0.461	0.123	0.109
	(0.011)	(0.022)	(0.017)
48	0.377	0.055	0.058
	(0.012)	(0.015)	(0.013)

Note: Presented figures are Kaplan-Meier survivor function estimates, which represent the probability of remaining employed past a certain duration. Figures in parentheses are standard errors. Involuntary separations refer to employment spells that ended because worker got laid off or because job was temporary.

Table 3: Employment Spell Proportional Hazard Regression Results by Exit State and Type of Exit

	All exits		Exit to Unemployment		Involuntary Separation	
Labour Force History						
Previous LFS involuntary separation	1.315	(2.78)	1.392	(1.14)	2.314	(3.89)
Previous LFS unemployment	1.159	(1.73)	2.572	(3.81)	1.826	(3.11)
Previous LFS school	1.623	(2.64)	2.172	(1.58)	2.844	(2.63)
Previous LFS inactivity	1.031	(0.31)	1.082	(0.27)	1.859	(2.93)
Proportion post-school spent unemployed	1.488	(1.30)	3.472	(1.72)	1.693	(0.83)
Proportion post-school spent NILF	1.265	(1.48)	1.063	(0.14)	1.103	(0.28)
Experience in occupation	0.994	(-1.42)	0.984	(-1.21)	0.995	(-0.63)
Job Characteristics						
Part-time hours	0.877	(-1.55)	0.911	(-0.41)	0.745	(-1.62)
Casual contract	1.789	(6.41)	2.599	(3.93)	2.856	(5.54)
Public sector	0.718	(-3.96)	0.901	(-0.47)	0.788	(-1.38)
Union member	0.780	(-2.65)	0.558	(-1.96)	0.832	(-0.92)
Small firm	1.183	(2.54)	1.660	(2.65)	1.194	(1.26)
Manager	1.048	(0.70)	0.867	(-0.73)	0.901	(-0.70)
Individual Characteristics						
Male	0.926	(-1.05)	0.962	(-0.19)	1.408	(2.08)
Aged 30-40	0.892	(-1.36)	0.910	(-0.41)	1.118	(0.58)
Aged 40-50	0.745	(-2.93)	0.659	(-1.51)	1.511	(1.91)
Aged 50+	0.640	(-3.41)	0.382	(-2.54)	1.198	(0.68)
Married	0.855	(-2.09)	0.734	(-1.41)	0.685	(-2.29)
Divorced or separated	1.122	(1.07)	1.496	(1.43)	0.881	(-0.55)
Number of young children	0.997	(-0.06)	0.655	(-2.35)	0.987	(-0.11)
Regional	0.810	(-2.58)	0.873	(-0.62)	0.758	(-1.54)
Rural	0.993	(-0.07)	0.656	(-1.39)	0.822	(-0.87)
English speaking COB	1.011	(0.11)	1.024	(0.08)	1.165	(0.73)
Non-English speaking COB	0.884	(-1.05)	0.947	(-0.16)	1.184	(0.72)
Non-fluent English	0.872	(-0.62)	1.737	(1.05)	0.839	(-0.43)
University degree	1.113	(1.13)	0.773	(-0.97)	1.380	(1.55)
Diploma	1.176	(1.39)	0.531	(-1.68)	1.534	(1.68)
Certificate	1.083	(0.87)	0.876	(-0.54)	1.223	(1.00)
High school graduate	0.973	(-0.27)	0.570	(-1.89)	1.296	(1.15)
Limiting illness	1.246	(2.29)	1.539	(1.74)	1.044	(0.21)
Rho	0.167		0.608		0.496	
LR test of Rho = 0 (*p*-value)	0.061		0.005		0.027	
Log likelihood	-7978		-1638		-2372	
Number of individuals	3044		3044		3044	
Number of individual-month thirds	200829		200829		200829	

Note: Presented figures are hazard ratio estimates from a complementary log-log, proportional hazard regression model with normally distributed unobserved heterogeneity. Figures in parentheses are *z*-statistics. Rho represents the proportion of the total variance contributed by individual-level unobserved heterogeneity. The reference dummy variable categories are: previous LFS employed, female, single, metropolitan residence, Australian born, fluent English, high school drop out, no limiting illness. 9 dummy variables describing the baseline hazard are omitted.

Table 4: Employment Spell Proportional Hazard Regression Models with Interaction Effects

	All exits		Exit to Unemployment		Involuntary Separation	
Previous LFS unemployment	0.230	(1.57)	0.899	(2.28)	0.738	(2.51)
Proportion post-school spent unemployed	0.812	(1.36)	2.518	(1.83)	1.398	(1.25)
Female dummy interacted with:						
Previous LFS unemployment	-0.305	(-1.93)	-0.394	(-1.02)	-0.178	(-0.56)
Proportion post-school spent unemployed	0.066	(0.11)	-1.754	(-1.18)	-2.089	(-1.44)
Aged less than 35 dummy interacted with:						
Previous LFS unemployment	0.170	(1.16)	0.203	(0.56)	-0.239	(-0.75)
Proportion post-school spent unemployed	-0.348	(-0.57)	-0.489	(-0.35)	-0.331	(-0.27)
High school drop out dummy interacted with:						
Previous LFS unemployment	0.047	(0.28)	0.528	(1.28)	0.158	(0.44)
Proportion post-school spent unemployed	-0.763	(-1.25)	-1.128	(-0.81)	-0.407	(-0.32)
Rho	0.170		0.605		0.493	
LR test of Rho = 0 (*p*-value)	0.063		0.006		0.026	
Log likelihood	-7975		-1635		-2370	
Number of individuals	3044		3044		3044	
Number of individual-month thirds	200829		200829		200829	

Note: In addition to variables presented, models include all variables included in Table 3. Presented figures are coefficients estimates from a complementary log-log, proportional hazard regression model with normally distributed unobserved heterogeneity. Figures in parentheses are *z*-statistics. Rho represents the proportion of the total variance contributed by individual-level unobserved heterogeneity.

Table 5: Employment Spell Proportional Hazard Regression Results Separately by Gender

	All exits		Exit to Unemployment		Involuntary Separation	
Males						
Previous LFS involuntary separation	1.400	(2.37)	1.552	(1.09)	1.869	(2.45)
Previous LFS unemployment	1.339	(2.14)	3.047	(3.07)	1.628	(1.96)
Previous LFS school	1.878	(1.86)	2.346	(0.88)	2.284	(1.33)
Previous LFS inactivity	1.085	(0.48)	1.049	(0.09)	1.416	(1.14)
Proportion post-school spent unemployed	1.178	(0.39)	5.411	(1.78)	2.385	(1.28)
Proportion post-school spent NILF	1.890	(1.96)	0.468	(-0.79)	1.153	(0.22)
Experience in occupation	0.993	(-1.18)	1.014	(0.87)	1.003	(0.30)
Females						
Previous LFS involuntary separation	1.269	(1.62)	1.334	(0.69)	2.886	(2.81)
Previous LFS unemployment	1.001	(0.01)	2.241	(2.43)	2.020	(2.40)
Previous LFS school	1.517	(1.80)	2.195	(1.34)	3.508	(2.27)
Previous LFS inactivity	0.970	(-0.23)	1.187	(0.46)	2.521	(2.92)
Proportion post-school spent unemployed	1.546	(0.86)	0.850	(-0.13)	0.342	(-0.81)
Proportion post-school spent NILF	1.301	(1.31)	1.394	(0.65)	1.325	(0.62)
Experience in occupation	0.995	(-0.74)	0.949	(-2.20)	0.984	(-1.06)

Note: In addition to variables presented, models include all variables included in Table 3. Presented figures are coefficients estimates from a complementary log-log, proportional hazard regression model with normally distributed unobserved heterogeneity. Figures in parentheses are *z*-statistics. Sample size for male only models equals 1438 individuals and 96,071 individual month-thirds. Sample size for female only models equals 1626 individuals and 105,861 individual-month thirds.

Table 6: Unemployment Spell Proportional Hazard Regression Results by Exit State

	All exits		Exit to Employment		Exit to School or Inactivity	
Labour Force History						
Previous LFS school	0.916	(-0.84)	0.671	(-3.19)	3.000	(3.67)
Previous LFS inactivity	0.816	(-3.17)	0.680	(-5.14)	1.768	(2.96)
Proportion post-school spent unemployed	0.236	(-5.89)	0.192	(-5.84)	0.558	(-1.15)
Proportion post-school spent NILF	0.540	(-4.70)	0.407	(-5.74)	1.388	(1.04)
Individual Characteristics						
Male	0.992	(-0.13)	1.023	(0.34)	0.815	(-1.22)
Aged 30-40	0.810	(-2.66)	0.864	(-1.74)	0.664	(-1.85)
Aged 40-50	0.691	(-4.10)	0.696	(-3.78)	0.723	(-1.36)
Aged 50+	0.535	(-5.86)	0.437	(-6.92)	1.117	(0.43)
Married	1.252	(3.28)	1.265	(3.21)	1.286	(1.35)
Divorced or separated	1.124	(1.32)	1.165	(1.59)	1.048	(0.20)
Number of young children	0.925	(-1.62)	0.841	(-3.06)	1.289	(2.08)
Regional	0.859	(-2.18)	0.808	(-2.81)	1.075	(0.41)
Rural	0.848	(-1.97)	0.818	(-2.20)	0.976	(-0.11)
English speaking COB	0.823	(-2.14)	0.795	(-2.34)	0.937	(-0.28)
Non-English speaking COB	0.673	(-4.02)	0.637	(-4.16)	0.885	(-0.51)
Non-fluent English	0.872	(-0.95)	0.776	(-1.51)	1.075	(0.22)
University degree	1.703	(6.24)	1.671	(5.64)	1.791	(2.53)
Diploma	1.236	(1.99)	1.230	(1.83)	1.323	(0.94)
Certificate	1.215	(2.52)	1.129	(1.46)	1.559	(2.16)
High school graduate	1.222	(2.28)	1.219	(2.09)	1.207	(0.81)
Limiting illness	0.800	(-2.91)	0.684	(-4.22)	1.323	(1.54)
Rho	0.072		0.029		0.537	
LR test of Rho = 0 (*p*-value)	0.071		0.329		0.007	
Log likelihood	-5799		-4597		-2001	
Number of individuals	1859		1859		1859	
Number of individual-month thirds	24975		24975		24975	

Note: Presented figures are hazard ratio estimates from a complementary log-log, proportional hazard regression model with normally distributed unobserved heterogeneity. Figures in parentheses are *z*-statistics. Rho represents the proportion of the total variance contributed by individual-level unobserved heterogeneity. The reference dummy variable categories are: previous LFS employed, aged < 30, female, single, metropolitan residence, Australian born, fluent English, high school drop out, no limiting illness. 16 dummy variables describing the baseline hazard are omitted.

Figure A1: Histogram of End Dates of Unemployment Spells Ending in School or Inactivity

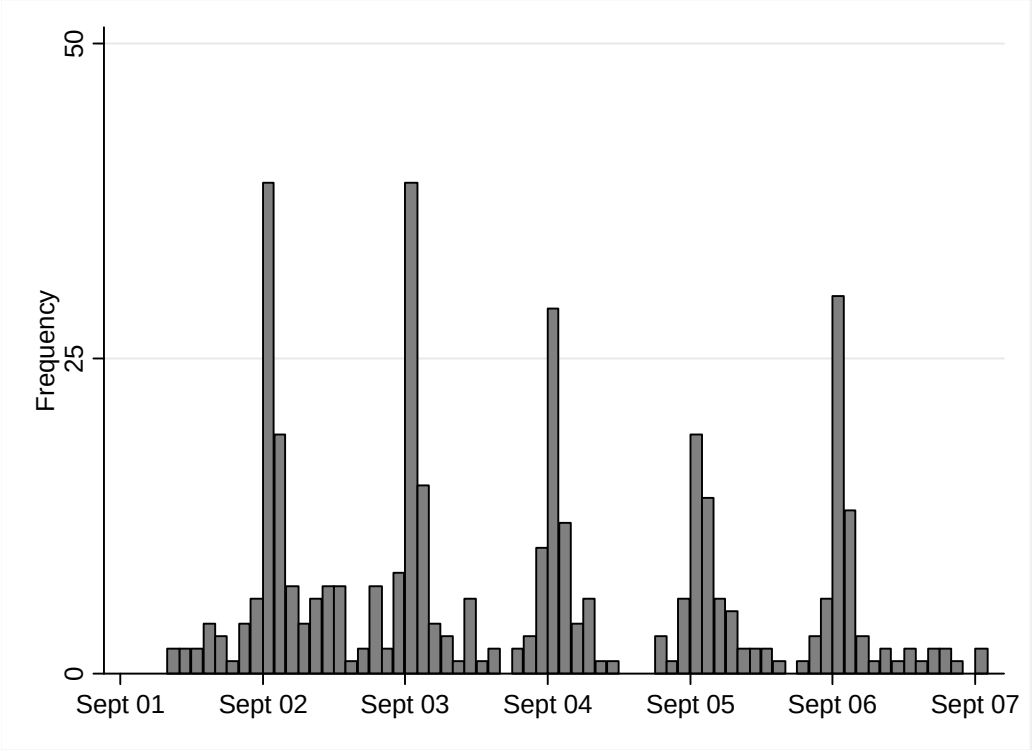

Figure A2: Histogram of End Dates of Unemployment Spells Ending in Employment

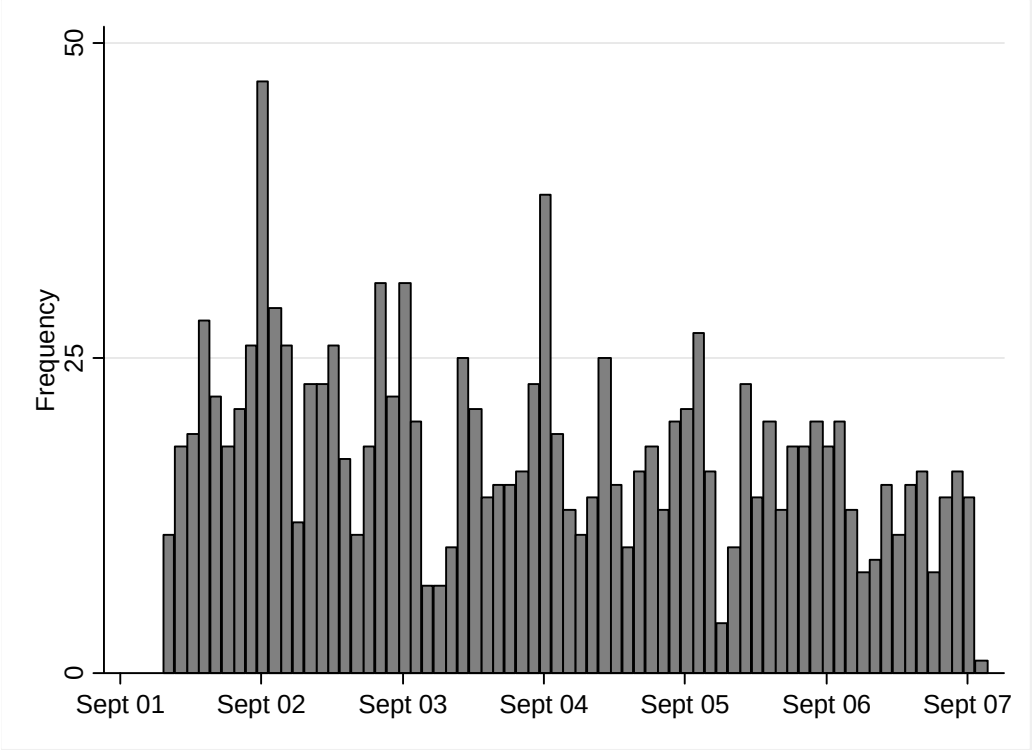

Table A1: Variable Definitions and Sample Means

Variable	Definition	Unemployment Spell Sample	Employment Spell Sample
Labour Force History			
Proportion post-school spent unemployed	Years post-school spent unemployed divided by years since left school	0.073	0.042
Proportion post-school spent NILF	Years post-school spent not in the labour force divided by years since left school	0.206	0.154
Experience in occupation	Years of experience in current occupation with all past employers.	-	5.065
Job Characteristics			
Part-time hours	Usually work less than 35 hours per week in current job (dv)	-	0.391
Casual	Employed on a casual basis (dv)	-	0.350
Public sector	Employed in the government or not-for-profit sectors (dv)	-	0.266
Union member	Member of trade union (dv)	-	0.148
Small firm	Number of people employed by firm less than 100 (dv)	-	0.481
Manager	Normally supervise work of other employees (dv)	-	0.356
Individual Characteristics			
Male	Gender is male (dv)	0.430	0.468
Age	Age in years	38.53	37.10
Married	Married or cohabitating (dv)	0.420	0.481
Divorced or separated	Divorced or separated (dv)	0.151	0.113
Number of young children	Number of children aged 0 to 4 years old	0.292	0.290
Regional	Reside in inner regional Australia (dv)	0.225	0.212
Rural	Reside in outer regional or remote Australia (dv)	0.144	0.119
English speaking COB	Country of birth was a non-Australian, English speaking country (dv)	0.110	0.116
Non-English speaking COB	Country of birth was a non-English speaking country (dv)	0.147	0.117
Non-fluent English	Does not speak English well (dv)	0.058	0.034
University degree	Highest educational attainment is a university degree (dv)	0.207	0.269
Diploma	Highest educational attainment is a diploma (dv)	0.084	0.093
Certificate	Highest educational attainment is a certificate (dv)	0.226	0.229
High school graduate	Highest educational attainment is high school graduate only (dv)	0.146	0.157
Limiting illness	A long-standing illness limits ability to work (dv)	0.178	0.120

Note: Variables associated with labour force history and individual characteristics are constructed from interview responses taken prior to spell commencement. Variables associated with job characteristics relate to the beginning of the employment spell under analysis and are time invariant. dv denotes the variable is a dummy variable.