THE UNIVERSITY OF MELBOURNE

FACULTY OF BUSINESS & ECONOMICS

Melbourne Institute Working Paper Series

Working Paper No. 32/13

The Low-Pay No-Pay Cycle: Are There Systematic Differences across Demographic Groups?

Yin King Fok, Rosanna Scutella and Roger Wilkins

MELBOURNE INSTITUTE®
of Applied Economic and Social Research

The Low-Pay No-Pay Cycle: Are There Systematic Differences across Demographic Groups?*

Yin King Fok, Rosanna Scutella and Roger Wilkins
Melbourne Institute of Applied Economic and Social Research
The University of Melbourne

Melbourne Institute Working Paper No. 32/13

ISSN 1328-4991 (Print)

ISSN 1447-5863 (Online)

ISBN 978-0-7340-4326-9

October 2013

* This research was conducted as part of ARC linkage project 'Job retention and advancement for disadvantaged jobseekers' with the Brotherhood of St Laurence (LP0776894). The paper uses the confidentialised unit record file from the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The HILDA Project was initiated and is funded by the Commonwealth Department of Social Services (DSS) and is managed by the Melbourne Institute of Applied Economic and Social Research. The findings and views reported in this paper, however, are those of the authors and should not be attributed to either DSS or the Melbourne Institute.

Melbourne Institute of Applied Economic and Social Research
The University of Melbourne
Victoria 3010 Australia
Telephone **(03) 8344 2100**
Fax **(03) 8344 2111**
Email **melb-inst@unimelb.edu.au**
WWW Address **http://www.melbourneinstitute.com**

Abstract

We investigate transitions between unemployment, low-paid employment and higher-paid employment using household panel data for the period 2001 to 2011. Dynamic panel data methods are used to estimate the effects of labour force status on subsequent labour force status. A distinctive feature of our study is the investigation of heterogeneity in the effects of unemployment and low-paid employment on future employment prospects. We find that there is state dependence in both unemployment and low-paid employment and clear evidence of a low-pay no-pay cycle for both men and women. Significant differences in effects across different subgroups of the population are, however, found. Typically, the young and the better educated face less severe penalties from unemployment or low-paid employment, and, for women, the cycle between low pay and no pay varies across subgroups. Moreover, in the case of men who have completed secondary schooling but have no further qualifications, low-paid employment actually decreases the chances of entering higher-paid employment by more than unemployment does. This is not the case for women, however, who clearly have a higher likelihood of entering higher-paid employment from low-paid employment than from unemployment, regardless of their age, education level or other characteristics.

JEL classification: J01, J31, J60

Keywords: Employment dynamics, state dependence, heterogeneous impacts

1. Introduction

Understanding the relationship between unemployment, low-paid employment and higher-paid employment is critical to developing effective welfare-to-work policies. Interest generally centres on whether low-paid employment provides a stepping stone to better jobs or simply represents an 'absorbing' or persistent state—or, even worse, is simply part of a perpetual cycle of low-paid employment and unemployment/non-employment. The stepping stone hypothesis hinges on low-paid jobs helping to develop employment-related skills and thereby improving the capacity of workers to progress into better jobs. Alternatively, low-quality low-paid jobs may be inherently unconducive to skills development and may, furthermore, tend to be insecure/unstable and possibly temporary in nature, leading to cycling in and out of employment.

Authors such as McCormick (1990) and Stewart (2006) go so far as to argue that low-paid employment has the same deleterious effect on future employment outcomes as unemployment, as employers use low-paid employment as a screening device to determine worker quality, in the same manner as they do with unemployment. If this is the case, it has quite major implications for the design of welfare-to-work policies. In particular, a 'work-first' strategy will not, on its own, be sufficient to get the unemployed on to a trajectory towards steady employment in 'decent' jobs. While Stewart (2007) indeed finds adverse effects of low-paid employment for men in the UK, evidence outside of the UK suggests that low-paid employment improves employment prospects compared to non-employment (Uhlendorff 2006, Buddelmeyer et al. 2010).

The literature to date has, however, given very little attention to the potential for past unemployment and low-paid employment to have quite different impacts on people with different characteristics. For instance, a spell of unemployment may have few adverse effects on future employment prospects for university-educated people in the prime of their working life, but have substantial adverse effects for older less-educated workers.

In this paper, we therefore examine whether there are systematic differences in the interrelated dynamics of unemployment and low-paid employment across demographic groups. First, we examine whether there is evidence of an overall 'low-pay no-pay' cycle and also, following Stewart, whether low-paid employment offers improved future employment opportunities over continued unemployment. We then examine whether there is heterogeneity in effects across different population groups. To answer these questions, we estimate a simultaneous model of the dynamics between unemployment, low-paid employment and higher-paid employment on Australian household panel data. Our approach accounts for unobserved heterogeneity and for the initial conditions problem that stems from the inclusion of a lagged dependent variable as a regressor.

Our study has several other distinctive features. First, we expand on the traditional definition of unemployment, which only includes people actively seeking employment, to include other jobless groups that are marginally attached to the labour force. Unemployment as a concept has important limitations as a measure of labour supply. It requires active search for employment, thereby eliminating people who would in fact work if employment was available. Second, we use a more appropriate definition of low pay for the Australian context. Third, we examine models for men and women separately. Existing literature has either focused on men only or examined men and women jointly (estimating a single model). We would argue that employment-unemployment dynamics of women are as of much interest as those of men and, moreover, the dynamic processes are likely to be different for men and women.

The paper is structured as follows. Section 2 reviews the previous literature on the dynamics of low-paid employment and unemployment. Section 3 describes the methods used to capture the dynamic relationship between the three labour force states—unemployment, low-paid employment and higher-paid employment—and Section 4 describes the data used. Estimation results are presented in Section 5, while Section 6 contains our conclusions.

2. Previous literature on the dynamics of low-paid employment and unemployment

It is widely accepted that there is state dependence in unemployment or that unemployment has a scarring effect (for example, Arulampalam et al., 2000; Knights et al., 2002).[1] There is also a growing literature finding similar state-dependence in low-paid employment, whereby employment of an individual in a low-paid job in one period itself increases the individual's probability of low-paid employment in the next period (for example, Stewart and Swaffield, 1999; Uhlendorff, 2006; Stewart, 2007). In this literature, low-paid employment is typically interpreted as being equivalent to low-quality employment, and state dependence is hypothesised to derive from the lack of skills development, and possibly deterioration of skills, that occurs in such jobs, or is at least perceived to occur in such jobs, thereby acting as a signal to prospective employers of low future productivity.

Few studies have, however, examined the relationship between unemployment and low-paid employment. Indeed, studies to have formally modelled the inter-related dynamics of unemployment and low-paid employment appear to be limited to Cappellari and Jenkins (2004), Stewart (2007), Uhlendorff (2006), Mosthaf et al. (2009), Buddelmeyer et al. (2010) and Mosthaf (2011). While each of these studies finds evidence of state dependence in both unemployment and low-paid employment, findings on the relationship between unemployment and low-paid employment are mixed.

[1] There is also evidence that there is duration dependence in unemployment—see, for example, Van den Berg and Van Ours (1996).

Cappellari and Jenkins (2004) estimate Probit models of labour market transition probabilities of British men, finding the low-paid have a higher probability of becoming unemployed and that the unemployed have a higher probability of becoming low-paid. Stewart (2007) more formally models the dynamics between unemployment and low-paid employment for British men, estimating bivariate probit panel models of the probability of unemployment and the probability of low-paid employment. In common with Cappellari and Jenkins (2004), he finds that the low-paid are more likely to become unemployed, and that the unemployed more likely to become low-paid. When examining second-order effects, Stewart furthermore finds that the unemployed entering low-paid employment are just as likely to become unemployed again as the unemployed, even after controlling for both observed and unobserved heterogeneity.

In a study of West German men, Uhlendorff (2006) estimates multinomial logit panel models that simultaneously model all movements between non-employment, low-pay and high-pay. He also finds evidence of a 'low-pay no-pay' cycle—that is, being low-paid or not employed itself increases the probability of being in one of these states in the next year. However, in contrast to Stewart (2007), he finds that low-paid employment improves employment prospects compared to non-employment, with those previously in low-paid jobs more likely to be in employment and in higher-paid jobs than those previously non-employed. Buddelmeyer et al. (2010) examine the effects of unemployment and low-pay on future unemployment in Australia using Stewart's (2007) approach. They examine both men and women, finding that low-paid women are significantly more likely to be unemployed a year later than women in higher-paid employment, but finding no such evidence for men. In addition, they find weak evidence that low-paid employment is a conduit for *repeat* unemployment for men, but not for women.

None of the aforementioned studies investigate heterogeneity in employment dynamics beyond Buddelmeyer et al.'s (2010) consideration of differences between men and women. Indeed, Mosthaf et al. (2009) and Mosthaf (2011) appear to be the only studies that attempt to investigate heterogeneity in the impacts of previous labour force status. Mosthaf et al. (2009) test how state dependence in low-paid employment in Germany differs with respect to firm and individual characteristics, and in fact find significant differentials in impacts. However, they examine women only and do not examine heterogeneity in the dynamics between unemployment, low-paid employment and higher-paid employment more broadly.

Mosthaf (2011) examines dynamics between all three labour force states using West German administrative data on male private sector employees over the period 2000 to 2006. Mosthaf finds that low-wage jobs are stepping stones to high-paid jobs for low-qualified workers, but for university-educated workers there is no difference between low-paid work and non-employment in the probability of moving into a high-paid job. However, his data source contained very little information about worker characteristics (other than educational attainment) and contained only private sector employees and

registered unemployed individuals—thereby excluding public sector employees, the self-employed and those not in the labour force. Moreover, Mosthaf excludes part-time employees because of the absence of information on hours of work. The findings on differences by educational attainment may therefore be an artefact of the data limitations—particularly the highly non-random nature of attrition from the sample (for example, as occurs if an employee moves into the public sector).

Our study, in undertaking a more representative and comprehensive analysis of the differences across demographic groups in the impacts of unemployment and low-paid employment on future employment prospects, therefore addresses a considerable gap in the existing literature.

3. Empirical model

The central aim of the study is to determine whether low-paid employment improves future employment prospects relative to non-employment. To do this, we estimate a dynamic random effects multinomial logit model of labour force states.[2]

The dynamic multinomial logit model with random effects is specified as a modification of the random effects multinomial logit model (Gong et al., 2004). Letting j be equal to 1 if unemployed, 2 if in low-paid employment and 3 if in higher-paid employment, the probability of individual i being in labour force state j at time $t > 1$ is

$$P(j / X_{it}, Y_{it-1}, \mu_{i2}, \mu_{i3}) = \frac{\exp(X'_{it}\beta_j + Y'_{it-1}\gamma_j + \mu_{ij})}{\sum_{k=1}^{J} \exp(X'_{it}\beta_k + Y'_{it-1}\gamma_k + \mu_{ik})}, \; i = 1,...,N; \; t = 2,...,11 \qquad (1)$$

where X_{it} is a vector of observed characteristics which vary between individuals and over time, Y_{it-1} is a vector of dummy variables indicating lagged labour force status (comprising binary choice indicators for the labour force state in period $t-1$, which may also be interacted with X_{it}), and μ_{ij} is time-invariant unobserved heterogeneity across individuals. β_j and γ_j are the parameters to be estimated from the data. Since the choice probabilities must sum to unity, restrictions are needed to ensure model identification. The elements of the vector β_1, as well as the unobserved heterogeneity term for the unemployed outcome, μ_{i1}, are therefore set equal to zero. The vector $\mu_i \equiv (\mu_{i2}, \mu_{i3})$ is assumed to follow a bivariate normal distribution with zero means and a 2×2 covariance matrix Σ_μ. As is standard in random-

[2] Individuals are interviewed on an annual basis in HILDA, with associated labour force information observed at that interview. Retrospective information on employment activity is also obtained via the use of a job calendar enabling the use of a continuous-time framework. However, job characteristics are not observable via the calendar. Consequently, continuous-time analysis would be limited and is therefore not pursued in this paper.

effects models, the unobserved heterogeneity term μ_{ij} is assumed to be independent of the explanatory variables X_{it}.

Inclusion of a lagged dependent variable as a regressor introduces the so-called initial conditions problem, caused by our lack of knowledge of the process determining initial labour force status. If the individual initial conditions are correlated with the individual random effect μ_i, the estimator will be inconsistent and tend to overstate state dependence—that is, overestimate the coefficient γ.

A number of methods have been proposed to account for initial conditions. In this paper, the approach suggested by Wooldridge (2005) is used, which estimates the distribution of the unobserved effect (μ_i) conditional on the initial values of the dependent variable (Y_{i1}) and other explanatory exogenous variables:

$$\mu_i = Y_{i1}'\lambda + \bar{X}_i'\pi + \mu_i \qquad (2)$$

where $\bar{X}_i$ is the average over the sample period of the observations on the exogenous variables, while the vector μ_i is bivariately normally distributed with zero means and a 2×2 covariance matrix Σ_μ, and is independent of $\bar{X}_i$ and the initial condition Y_{i1}. Equation (2) is substituted into Equation (1), where the statistical significance of coefficient λ indicates whether accounting for the endogeneity of the initial conditions is relevant.

This approach has the advantage of being able to use standard random effects econometrics software, and appears to perform as well in longer panels $(t \geq 10)$ as the method proposed by Heckman (1981) (for example, see Akay, 2009). It also addresses the closely related issue of serially correlated heterogeneity, not accounting for which can lead to overestimation of state dependence. Specifically, the standard random effects specification for unobserved heterogeneity requires the implausible assumption that the unobserved component is independent of the exogenous explanatory variables. However, following Mundlak (1978), the inclusion of the means of the time-varying variables $(\bar{X}_i)$ as explanatory variables allows for the possibility that heterogeneity is correlated with the explanatory variables.

The model parameters are obtained by maximum simulated likelihood estimation of the random effects logit model using the NLOGIT program in the econometric software *Limdep*. Mean marginal effects are reported in the tables, with the estimated marginal effects simulated probabilities holding all other variables constant.

4. Data and definitions

Data

The data used in this analysis come from the first 11 waves of the Household, Income and Labour Dynamics in Australia (HILDA) Survey, an indefinite-life household panel study that began in 2001 with 13,969 respondents in 7,682 households. All sample members aged 15 years and over are interviewed annually, with detailed information collected on labour market activity, education, income, health, wellbeing, family relationships and a variety of other topics. In Wave 11, interviews were obtained with 13,602 individuals, although only 7,229 individuals had been interviewed in all 11 waves.[3]

The sample in this analysis is restricted to individuals aged 21 to 54 years. Persons aged less than 21 years are excluded because of the potential complications arising for persons transitioning from study to employment. Likewise, we also omit persons aged 55 years and older due to the transition between employment and retirement. The self-employed and employees of their own business have been excluded, as have full-time students. Individuals enter the estimation sample from the first wave in which they were at least marginally attached to the labour force (which may be after Wave 1). An individual contributes an observation in a given wave if current-wave and previous-wave labour force status are known and the individual was in the extended labour force (that is, with a marginal or stronger attachment to the labour force) in both waves.

Definitions

Measuring unemployment

The key explanatory variable for this analysis is labour force status. In categorising respondents into the three mutually exclusive categories of employed, unemployed and not in the labour force, the HILDA Survey applies conventions consistent with those set by the International Labour Organisation (ILO). Indeed, the relevant question sequence is largely borrowed from the Labour Force Survey administered by the Australian Bureau of Statistics (ABS) to measure aggregate employment and unemployment. The definitions of employment and unemployment employed in this study therefore accord with widely accepted standards and definitions, also generating cross-sectional estimates of the major aggregate labour market statistics (for example, the unemployment rate and labour force participation rate) that are very similar to the official labour force statistics produced by the ABS.

[3] HILDA Survey non-response rates are significant, but compare favourably with other household panel studies, such as the British Household Panel Study and the German Socio-Economic Panel. Moreover, analysis by Watson and Wooden (2004) suggests that the impact of any resultant bias is, at least for the first few waves, likely to be relatively small. In Wave 11 (2011), a new 'top-up' sample of 4,009 respondents in 2,153 households was added to address declining sample representativeness over time, primarily due to immigration between 2001 and 2011. These respondents are necessarily excluded from our estimation sample because only one wave of data had been collected as of Wave 11.

Unlike most previous research, this analysis moves beyond a focus on the narrow definition of unemployment—that is, without employment, available to work, and engaged in active job search—to include persons marginally attached to the labour force—that is, persons not in the labour force, but willing and able to work. This enables a more complete analysis of employment transitions to include groups such as single parents and people with disabilities, who are relatively more likely to be marginally attached than unemployed (and who have been targets of policy efforts to increase employment participation in many developed countries in recent years). Non-employed people who do not express a preference for work are excluded from our main analysis, although, for women, we examine sensitivity of estimates to their inclusion in the 'unemployed' category. In the remainder of this paper, we refer to the group comprising the unemployed and marginally attached as the 'unemployed' and refer to persons unemployed according to the standard ILO definition as 'unemployed in active job search'.

Defining low-paid work

There is no universally accepted definition of low pay, although studies of low-paid employment have most commonly used low-pay thresholds either based on some fraction of median (hourly) earnings (for example, Stewart and Swaffield, 1999; Uhlendorff, 2006), or as some function of the legislated minimum wage (for example, Smith and Vavricheck, 1992). In this paper, we adopt the latter approach, largely because of the particular nature of the Australian labour market. We define a person to be low-paid if their hourly rate of pay is less than 120 per cent of the hourly Federal Minimum Wage (FMW) and their weekly earnings are also less than 120 per cent of the weekly FMW.

The hourly FMW is the lowest rate of pay legally payable to an adult non-trainee employee. However, it applies to relatively few employees because of the Australian 'Award' system, an artefact of the system of centralised wage determination that applied prior to the mid-1990s, under which legal minimum rates of pay are specified for most occupations and industries. At its peak in the 1980s, over 70 per cent of employees were paid exactly the rate specified in the relevant Award. Awards persist to this day, and almost all specify a minimum rate of pay in excess of the FMW (often considerably higher), although only approximately 20 per cent of employees are now paid exactly the Award rate. Moreover, many Awards specify a higher minimum rate for 'casual' employees, who are generally not entitled to paid leave for sickness and holidays; therefore, once leave entitlements are taken into account, casual employees effectively have a lower wage than a permanent employee on the same cash wage. Thus, very few employees would be classified as low-paid, including most low-paid casual employees, if the threshold was set exactly equal to the FMW.

The weekly earnings criterion for low pay allows us to exclude workers with relatively high earnings but who are working quite long hours. Our hourly wage variable is derived from reported usual pay (typically weekly or fortnightly) and usual weekly hours of work. Relatively high earnings but with high hours of work

will produce a low hourly wage, but may reflect a preference for working longer hours at lower intensity, or indeed misreporting of working hours.

We test the sensitivity of our findings to two alternative definitions of low pay, the first employing a threshold of 150 per cent of the FMW, and the second definition employing a threshold of two-thirds of the median wage. For both these alternative definitions, the hourly and weekly criteria are applied.

Other variables

The characteristics of the jobless tend to be very different to the remainder of the population: they are more likely to be female, sole parents, either quite young or quite old and/or have low levels of education. The combination of these characteristics may help explain differences in the likelihood of being unemployed or low-paid and thus these characteristics need to be controlled for. In selecting control variables we essentially follow the previous literature and include controls for: age; marital status; family characteristics (the number of dependent children in the household and a separate control for lone parents); whether of indigenous origin (that is, an Aboriginal or Torres Strait Islander); whether born overseas, with immigrants born in one of the main English-speaking countries distinguished from those born elsewhere; English language speaking ability; whether suffering from a severe or moderate long-term health condition or disability; educational attainment; location of residence (urban/rural); a year time trend; and the unemployment rate in the state of residence to capture business cycle and state effects. Summary statistics of these variables over the 11 waves are provided in Appendix Table A1.

Employment dynamics for males and females differ considerably. We therefore estimate separate models for the two sexes. We further hypothesise that the employment dynamics differ by other personal characteristics. However, rather than estimate separate models for each population sub-group (defined by characteristics), we estimate models that include interactions between variables for these characteristics and previous-wave labour force status. Specifically, we estimate models that include interactions with variables for age, immigrant and indigenous status, presence and age of dependent children, disability and educational attainment. We expect to find that young people often experience low-paid employment as a stepping stone to higher-paid employment, while older people are more likely to experience low-paid employment as a persistent state. We similarly expect more persistence in low-paid employment among the less-educated, people with a long-term health condition or disability, and perhaps immigrants from non-English speaking countries and indigenous people. Likely effects of dependent children are less clear, although it might be expected that low-paid employment is less persistent for women with young children, since the intensity of caring requirements tend to diminish as the children age, permitting increasing commitment to the labour market over time.

5. Results

Descriptive statistics

Table 1 presents, for each of the 11 waves of the HILDA Survey, the earnings thresholds and incidence of low pay for three definitions of low pay: i) 120 per cent of the FMW, which is our preferred measure; ii) two-thirds of the median wage, which is a widely used threshold in the international literature; and iii) 150 per cent of the FMW. Specifically, Panel A presents the hourly and weekly earnings thresholds for each definition, while Panel B presents the proportion of workers below the hourly thresholds and the proportion of workers below both the hourly and weekly thresholds. Note that, for the thresholds based on the FMW, the weekly earnings threshold is simply equal to the hourly threshold multiplied by 38, which is the number of hours specified in the weekly FMW. The two-thirds median weekly threshold is based on actual weekly earnings, irrespective of the number of hours worked.

Table 1: Low-pay thresholds and incidence of low-paid employment under different thresholds

A. Earnings thresholds

	Hourly earnings thresholds ($)			Weekly earnings thresholds ($)		
Wave	120% of FMW	2/3 median wage	150% of FMW	120% of FMW	2/3 median wage	150% of FMW
1 (2001)	13.1	11.4	16.4	497.0	383.3	621.3
2 (2002)	13.7	12.3	17.1	519.8	425.3	649.8
3 (2003)	14.2	12.8	17.7	538.1	426.7	672.6
4 (2004)	14.8	13.3	18.5	560.9	466.7	701.1
5 (2005)	15.4	13.9	19.2	583.7	496.0	729.6
6 (2006)	16.2	14.6	20.3	615.6	496.7	769.5
7 (2007)	16.4	15.4	20.6	624.7	533.3	780.9
8 (2008)	17.2	16.4	21.5	652.1	565.3	815.1
9 (2009)	17.2	16.7	21.5	652.1	600.0	815.1
10 (2010)	18.0	17.7	22.5	684.0	644.0	855.0
11 (2011)	18.6	18.8	23.3	706.8	644.7	883.5

B. Incidence of low-paid employment

	Percentage below hourly threshold			Percentage below both hourly & weekly thresholds		
	120% of FMW	2/3 median wage	150% of FMW	120% of FMW	2/3 median wage	150% of FMW
1 (2001)	22.0	14.4	38.7	17.3	10.2	33.0
2 (2002)	22.7	16.2	39.7	18.4	11.8	32.9
3 (2003)	22.7	16.3	40.2	18.4	11.8	33.8
4 (2004)	22.9	16.5	41.7	18.9	12.4	35.7
5 (2005)	23.7	17.4	41.8	19.2	12.7	35.3
6 (2006)	24.4	17.9	43.4	20.5	12.8	37.1
7 (2007)	22.4	18.4	40.9	18.7	13.6	34.7
8 (2008)	22.2	18.8	40.3	18.6	13.6	34.5
9 (2009)	18.5	16.1	35.4	15.7	12.5	30.4
10 (2010)	18.7	17.7	35.5	15.7	14.2	30.7
11 (2011)	17.9	18.1	34.7	14.9	12.8	29.1

Note: FMW—Federal Minimum Wage.

The hourly threshold for our main definition of low pay, 120 per cent of the minimum wage, ranges from $13.10 per hour (2001) to $18.60 (2011). This threshold tends to be higher than the two-thirds of the median wage threshold, although the divergence between the two thresholds decreases over the 11 waves—indeed, in Wave 11, the two-thirds median wage threshold is higher than the threshold based on the minimum wage. As the lower panel of the table shows, an additional 4 to 5 per cent of the main

analysis sample would have been classified as low-paid in each of the waves if the low-pay definition did not impose the weekly wage condition in addition to the hourly wage condition.

Table 2 explores the personal characteristics of persons in each labour force state in the pooled (Waves 1 to 11) sample. These findings are broadly consistent with previous literature showing that females, single parents, migrants from Non-English speaking countries or those of indigenous origin, those living outside of major urban areas, people with a severe/moderate illness or disability, the low-educated, and those who do not have a partner, whether legally married or de facto, are more likely to be unemployed or low-paid as opposed to higher-paid.

The table also presents the proportion in each lagged labour force state for each (current) labour force status group. Here, if we combine the two lagged non-employment categories, there is some indication that low pay is actually the least persistent among the three labour market states. Less than half (48%) of the low-paid were low-paid in the previous period. In contrast, about 74% of the 'unemployed' were not working (unemployed or not in the labour force) in the previous period, while the persistence of high pay is even higher, at 87%.

Table 2: Characteristics of full sample, by labour force status (%)

	'Unemployed'	Low-paid worker	Higher-paid worker
Male	34.4	38.9	53.4
Age group			
21-29	30.3	35.8	24.7
30-39	31.2	24.6	30.1
40-54	38.5	39.6	45.2
Partnered	56.3	61.2	71.8
Have dependent children	55.6	43.5	48.5
Lone parent	16.6	8.3	5.4
Place of birth and indigenous status			
Australia	68.7	77.3	78.5
ESB immigrant	8.2	7.4	9.5
NESB immigrant or indigenous	23.1	15.3	12.0
Illness or disability	29.5	11.3	6.7
Educational attainment			
Less than secondary	42.4	33.2	18.7
High school	17.2	22.4	14.9
Certificate Level 3 or 4	25.8	32.1	33.0
Bachelor's degree and above	14.6	12.3	33.3
Section of state			
Major urban	59.5	56.0	66.2
Other urban	26.6	27.3	21.5
Bounded locality or rural	14.0	16.7	12.2
Labour force status in previous wave			
Not in the labour force	29.6	4.2	2.0
'Unemployed'	44.3	9.5	3.3
Low-paid	7.6	48.0	7.8
Higher-paid	18.5	38.4	87.0
Number of observations	9,577	9,217	53,957

Table 3 presents the labour forces states of respondents across the 11 waves of the HILDA Survey. There is evidence that general labour market conditions improved over the first 8 waves, with the employment rate (low-paid and higher-paid employment combined) peaking in Wave 8 and then falling in Wave 9. This

coincides with the general improvement in the labour market between 2001 and 2008, and the economic downturn in the year following. Significantly, the proportion of the sample in the higher-paid category increased over the period, rising from 70.5% in Wave 1 to 76.8% in Wave 9, and dropping only slightly in Waves 10 and 11, to be 75.4% in Wave 11.

Table 3: Proportion in each labour market state, by wave (%)

	Wave										
	1	2	3	4	5	6	7	8	9	10	11
'Unemployed'											
Marginally attached	11.4	10.7	10.0	9.4	8.7	7.6	7.5	6.9	8.3	8.2	9.3
Unemployed, in active job search	5.4	4.8	4.2	3.6	3.8	3.6	3.4	3.4	4.4	4.8	4.5
Employed											
Low-paid	12.7	13.9	13.5	13.8	13.5	15.4	12.6	13.1	10.4	10.3	10.8
Higher-paid	70.5	70.6	72.4	73.2	74.1	73.4	76.5	76.6	76.8	76.7	75.4
Number of individuals	7,135	6,660	6,332	6,108	6,313	6,360	6,243	6,223	6,381	6,498	8,502

Table 4 presents descriptive statistics on labour force state transitions between waves, restricting to those with a marginal or greater attachment in both of the waves. Panel A shows a substantial proportion of individuals remaining in the same state from one wave to the next. For instance, among those in the extended labour force in both waves, 58% of those who were 'unemployed' in the first wave remained 'unemployed' in the next wave. Likewise, 46.8% of those who were working in low-paid jobs remained so one year later. In terms of transitions between unemployment and low-paid work, we see a greater proportion of shifts from unemployment to low pay than the reverse—12.8% of the unemployed in the first wave were in a low-paid job in the next wave, whereas only 6% of the low-paid had become unemployed. The same broad patterns hold when we look at two-year and three-year changes (Panels B and C of Table 4). As expected, however, the level of persistence in each labour market state is lower the longer time frame; correspondingly, the proportion that has made a transition between states generally rises.

Table 4 Transitions between labour market states as a proportion of group in initial state (%)

	'Unemployed'	Low-paid	Higher-paid	Total	Number of observations
Panel A: Transition from t to t+1					
'Unemployed'	58.0	12.8	29.3	100.0	5,067
Low-paid	6.0	46.8	47.3	100.0	6,303
Higher-paid	2.4	6.2	91.4	100.0	39,585
Panel B: Transition from t to t+2					
'Unemployed'	48.2	15.4	36.5	100.0	4,115
Low-paid	7.2	38.3	54.3	100.0	5,151
Higher-paid	2.9	6.2	91.1	100.0	31,949
Panel C: Transition from t to t+3					
'Unemployed'	42.8	16.9	40.3	100.0	3,430
Low-paid	7.2	33.0	59.9	100.0	4,225
Higher-paid	3.0	6.1	91.0	100.0	25,828

Estimation results

In this section we discuss the results of estimation of the dynamic random effects multinomial logit models of labour force status for males and females. Results showing the overall impacts of lagged labour force status on current labour force status, where low pay is defined as less than 120% of the federal minimum wage, are presented in Table 5. Models were also estimated for our two alternative definitions of low-pay, but estimated effects were qualitatively very similar and are therefore not reported.[4] Given the interdependence between the effects of explanatory variables (the marginal effect of each explanatory variable depends on the values of all explanatory variables), to provide more meaningful results, mean marginal effects estimates are presented. That is, the marginal effect of the explanatory variable on the predicted probability of the outcome is evaluated for each sample member and the mean value over all sample members is obtained.[5]

The estimates for demographic characteristics are consistent with expectations: the probability of unemployment (inclusive of marginal attachment) increases with age and is higher for those who have dependent children, particularly for those with younger children. Immigrants from non-English speaking countries (NESB immigrants) or those with indigenous origins also have a higher probability of being unemployed. NESB immigrants, individuals of indigenous descent and older men are more likely to be in low-paid work. In addition, the magnitudes of the mean marginal effects are also in line with expected gender differences, with the relative greater importance of dependent children in influencing women's employment as expected.

The estimated effects of human capital characteristics also accord with expectations. For instance, a severe or moderate long-term illness or disability reduces the likelihood of employment by about the same magnitude for both genders. Educational attainment also clearly matters, with unemployment and low pay less likely for those with higher educational qualifications, although the effects of education on the probability of low pay for women are limited to a weakly significant effect of university qualifications. Also apparent from the table is that work experience has an impact on labour market outcomes, with the likelihood of unemployment and low-paid employment at first decreasing with years of work experience, and then increasing again for those with lengthy experience in the work force.

The linear time trend indicates that, for women, the probability of being unemployed is on average decreasing over the 2001 to 2011 period; while the probability of being in low-paid employment is on average decreasing for both men and women over the 11 years. In addition, we find that the probability of

[4] Estimates relating to the low-pay no-pay cycle for alternative low-pay thresholds and definitions of 'unemployment' are presented in Appendix Table A2. Full estimation results are available from the authors on request.

[5] For categorical variables, the 'marginal effect' is in fact the change in predicted probability of the outcome as a result of changing the variable from 0 to 1.

being unemployed is sensitive to state unemployment rates, an effect that is even stronger for women. This is consistent with a scenario where females' labour supply is more elastic than males, as would be expected under traditional gender roles. State unemployment rates do not, however, seem to affect the probability of being in low-paid employment. Moreover, on the whole, the effects of the time trend and the state unemployment rate are very mild compared to the other covariates in the model.

Table 5: Dynamic random effects multinomial logit model of labour force status—Mean marginal effects (%)

	Males			Females		
	'Unemployed'	Low-paid	High-paid	'Unemployed'	Low-paid	High-paid
Age group (Reference category: 21-29*)*						
30-39	4.71 ***	1.77 ***	-6.48	4.81 ***	-0.30	-4.52
40-54	10.17 ***	2.24 ***	-12.41	8.37 ***	-0.45	-7.92
Partnered	0.13	-0.41	0.29	0.50	-1.03	0.53
Have dependent children	4.03 ***	0.35	-4.38	13.91 ***	-0.40	-13.51
Age of youngest child	-0.18 ***	-0.03	0.22	-0.87 ***	0.26	0.61
Lone parent	-	-	-	-1.52	-1.06	2.58
NESB immigrant or indigenous	1.25 **	1.91 ***	-3.16	3.18 ***	0.89 *	-4.07
Illness or disability	4.97 ***	-0.96	-4.01	5.86 ***	-3.12	-2.74
Educational attainment (Reference category: Less than high school completion*)*						
High school	-3.83 **	2.49	1.34	-0.19	-0.85	1.04
Certificate or diploma	-3.73 ***	-4.33 ***	8.05	-4.35 ***	0.39	3.96
Bachelor's degree and above	-5.18 ***	-5.19 ***	10.37	-6.20 ***	-3.68 *	9.88
Years of work experience	-0.79 ***	-0.63 ***	1.42	-1.25 ***	-0.10 ***	1.35
Years of work experience^2/10	1.38 ***	1.25 ***	-2.63	2.91 ***	-0.55	-2.37
Section of state (Reference category: Major urban*)*						
Other urban	0.93	0.06	-0.99	0.76	-0.31	-0.45
Bounded locality or rural	4.19 ***	2.10 **	-6.29	2.71 *	0.59	-3.30
Wave	-0.02	-0.35 ***	0.38	-0.10 ***	-0.63 ***	0.74
Unemployment rate	0.65 ***	-0.04	-0.60	0.83 ***	-0.35	-0.47
Mean 'Partnered'	-0.41 ***	-0.35 ***	0.76	0.30	-0.38	0.09
Mean 'Have dependent children'	-0.13	-0.01	0.14	-0.88 ***	0.26	0.63
Mean 'Lone parent'	-	-	-	0.72 ***	-0.43	-0.30
Mean 'Illness or disability'	0.61 ***	0.51 ***	-1.12	0.94 ***	0.39 ***	-1.33
Mean 'High school'	0.08	-0.39 *	0.30	-0.21	-0.13	0.33
Mean 'Certificate or diploma'	0.25	0.21	-0.45	0.11	-0.28	0.16
Mean 'Bachelor's degree and above'	0.17	-0.02	-0.15	0.20	-0.94 ***	0.75
Mean 'Live in other urban area'	-0.06	0.07	-0.02	-0.06	0.30	-0.25
Mean 'Live in bounded locality or rural area'	-0.38 ***	0.06	0.32	-0.24	0.23	0.01
'Unemployed' in initial wave	5.00 ***	3.06 ***	-8.06	8.55 ***	4.40 ***	-12.95
Low-paid in initial wave	-0.44	7.28 ***	-6.85	-0.06 **	9.99 ***	-9.93
'Unemployed' in *t–1*	14.46 ***	4.30 ***	-18.76	23.72 ***	1.77 ***	-25.49
Low-paid in *t–1*	2.02 ***	12.35 ***	-14.37	2.89 ***	11.16 ***	-14.04
Log likelihood	-5,746.269			-86,16.946		
Number of observations	16,613			16,302		
Number of individuals	3,624			3,761		

Note: ***, ** and * respectively indicate statistical significance at the 1, 5 and 10 per cent levels.

Consistent with the previous literature, the results clearly indicate that there is state dependence in both unemployment and low-paid employment, even after controlling for individual heterogeneity. Being unemployed on average increases the chance of being unemployed in the next wave by 14.46 percentage points for men and 23.72 percentage points for women. In comparison, low pay is a less persistent state:

being low-paid in one wave only raises the probability of being low-paid in the next wave by an average of 12.35 percentage points for men and 11.16 percentage points for women.

The result of most interest for this paper is that there is clear evidence of a low-pay no-pay cycle in the Australian labour market, for both men and women. Compared with higher-paid employment, unemployment on average increases the probability of entering low-paid employment by 4.3 percentage points for men and by 1.77 percentage points for women; while low-paid employment increases the probability of entering unemployment by an average of 2.02 percentage points for men and 2.89 percentage points for women.

Although there is a significant low-pay no-pay cycle evident, the estimates nonetheless indicate that low-paid employment improves future labour market prospects relative to unemployment. Compared with higher-paid employment, unemployment on average increases the probability of being unemployed in the next year by 14.46 percentage points for men and 23.72 percentage points for women; and it on average decreases the chances of entering higher-paid employment by 18.76 percentage points for men and 25.49 percentage points for women. Low-paid employment, by contrast, only increases the likelihood of entering unemployment by 2.02 percentage points for men and 2.89 percentage points for women, and decreases the likelihood of entering higher-paid employment by approximately 14 percentage points for both men and women.

For both men and women, our findings are broadly consistent with the findings of the three German studies—Uhlendorff (2006), Mosthaf et al. (2009) and Mosthaf (2011). Our findings for Australian women are also consistent with Buddelmeyer et al. (2010). However, for men, our findings differ somewhat from the findings of Buddelmeyer et al. (2010), who found no evidence to suggest that low-paid employment increased the risk of unemployment, and found only weak evidence of low-paid employment increasing the risk of re-entering unemployment. There are several possible explanations for this. The first is that we use a further four waves of data and observe people first over an improving labour market and then a worsening one. The second potential explanation is that we adopt a multinomial model specification, simultaneously estimating the inter-relationships between unemployment, low-paid employment and higher-paid employment. Buddelmeyer et al. (2010), by contrast, estimate only binomial models of the probability of unemployment. A third potential explanation is that Buddelmeyer et al. (2010) adopt narrower definitions of unemployment (those in active job search) and low pay (two-thirds of the median wage). However, tests of the sensitivity of our results to alternative definitions of low pay and unemployment, presented in Appendix Table A2, indicate that differences in unemployment and low pay definitions do not in fact

explain the differences in findings.[6] The differences must therefore be attributable to the use of a longer panel, spanning both an expansion and contraction in employment, and/or the differences in model specification.

Accounting for heterogeneity in the impacts of unemployment and low-paid employment

Unemployment and low-paid employment might have quite different impacts on future labour market outcomes for people with different characteristics. For instance, it might be expected that, for university-educated people in the prime of their working life, a spell of unemployment will have little effect on their future employment prospects. However, if an older, less-educated, person had a similar spell of unemployment, they may find it much more difficult to get back into the workforce and work their way up the career ladder again.

To examine heterogeneity in the impact of unemployment and low-paid employment, we estimate the same dynamic random effects multinomial logit model of labour force status as presented in Table 5, but add interactions between variables for various demographic characteristics and the lagged labour force status variables. The interacted characteristics comprise age, whether a non-English speaking immigrant or of indigenous origin, whether have children and age of youngest child, whether have a severe or moderate illness or disability, and educational attainment.

Estimated mean marginal effects for this model are presented in Table 6, which indeed shows evidence of heterogeneity in the effects of unemployment and low-paid employment on subsequent labour force status.[7] Specifically, significant differences are evident by age group, immigrant/indigenous status, educational attainment and, for women, the presence of children.

Table 6 presents only the partial effects of each of the interaction terms, and consequently it is difficult to determine the overall dynamics of unemployment and low-paid employment for each of the demographic subgroups examined. Therefore, in Table 7, we present the 'total' marginal effects of previous-period unemployment and low-paid employment for the interacted characteristics. The total marginal effect is calculated as the effect of changing both the lagged labour force status variable and its interaction with the

[6] We in fact conduct a number of sensitivity checks, adopting various definitions of unemployment and low pay, the results of which are all presented in this Appendix table. They show that our key findings are robust to the alternative definitions.

[7] As noted earlier, mean marginal effects address the dependence of the marginal effect of an explanatory variable on the values of all explanatory variables (although this of course obscures the variability of the marginal effect depending on the values of the covariates, which is arguably also of interest). In the case of interactions of categorical variables, by calculating the actual change in predicted probability from changing the interaction term from 0 to 1, mean marginal effects are also valuable for addressing the problem that the analytic marginal effect is not simply the partial derivative with respect to the interaction term, but rather is the cross-partial derivative with respect to the two interacted variables (Ai and Norton, 2003). Note, however, that estimated mean marginal effects are nonetheless an abstraction, since only the interaction term is changed from 0 to 1, whereas in practice, if the interaction term changes from 0 to 1, at least one of the two individual variables that are interacted necessarily also changes from 0 to 1.

relevant characteristic from 0 to 1. For example, to calculate the effect of lagged unemployment for the 30-39 age group, for every sample member, the lagged unemployment variable and its interaction with the aged 30-39 dummy are set equal to zero. We then change both of these variables from 0 to 1 for every sample member, and calculate the mean change in predicted probability of each outcome. It is these total marginal effects that we refer to in the following discussion, although we refer back to Table 6 when discussing the statistical significance of differences across demographic groups.

Considering first persistence in unemployment, state dependence in unemployment is somewhat less pronounced for the young, becoming more pronounced at older ages. For men, unemployment increases the probability of unemployment in the next year by 12.56 percentage points in the base case, by 18.3 percentage points for men aged 30 to 39 years and by 22.95 percentage points for men aged 40 to 54. Women overall have a higher degree of persistence in unemployment, with women in the 30-39 and 40-54 age groups having similar persistence, at approximately eight percentage points higher than for younger women.

Unemployment persistence does not significantly differ by immigrant and indigenous status for men or women, and for men it does not depend on the presence of dependent children. For women, however, unemployment persistence is significantly less pronounced when dependent children are present, although the estimates show unemployment persistence is increasing in the age of the youngest child. The turning point occurs when the youngest child reaches almost 10 years of age, with the total mean marginal effect of having a youngest dependent child aged 10, at 24.89, only marginally higher than that for the base case for women. This is perhaps not unexpected, as societal norms are likely to result in employers penalising women who are out of the workforce caring for young children much less than they would childless women or women with older children with a history of unemployment.

As expected, state dependence in unemployment tends to become less pronounced with higher levels of education for both men and women, although only men and women with bachelor's degrees (or higher) have a statistically significant lower level of unemployment persistence. Men with a bachelor's degree actually experience quite low levels of unemployment persistence, prior unemployment only increasing the probability of current unemployment by just over 4 percentage points. For women with a bachelor's degree, on the other hand, although the extent of state dependence is approximately half of that for other women, there remains considerable persistence, with a total mean marginal effect of 11.59 percentage points.

There is likewise evidence of heterogeneity in the extent of state dependence in low-paid employment. For both men and women, the effect of prior-year low-paid employment is larger for those in older age groups, although for women this effect is only weakly statistically significant for the oldest age group. For men, compared with 21-29 year-olds, low-paid employment increases the probability of remaining low-paid in the next year by 4 percentage points for 30 to 39 year olds (11.51 – 7.51) and by 4.9 percentage points for 40 to 54 year olds (12.36 – 7.51). For women, low-paid employment increases the probability of being low-

paid in the next year by 2.1 percentage points for 40 to 54 year olds compared with 21-29 year-olds. For NESB immigrant and indigenous men, low-paid employment is significantly less persistent than for other men, with an overall mean-marginal effect of 2.53 percentage points.

The extent of state dependence in low-paid employment also differs by level of educational attainment. Perhaps surprising is that the broad pattern is one of increasing persistence in low-paid employment as educational attainment increases, although the relationship is not monotonic. For men, we find the effect of low-paid employment on the likelihood of low-paid employment in the next year is lowest for those who have not completed high school, and highest for those who had completed high school (with a total mean marginal effect of 13.49 percentage points), followed by those who have attained a bachelor's degree (11.86 percentage points). Similarly, for women, persistence of low-paid employment is lowest for those who have not completed high school, and highest for those who have attained a bachelor's degree (with a total mean marginal effect of 13.66 percentage points), followed by those who had completed high school (13.32 percentage points). However, consistent with Mosthaf et al. (2009), the presence of children does not appear to alter the extent of state dependence in low-paid employment for men or women.

Finally, there is evidence of heterogeneity in the experience of the low-pay to no-pay and no-pay to low-pay paths, although primarily for women. The effect for women of low-paid employment on the probability of entering unemployment is increasing in age, is lower for NESB immigrants and indigenous persons, and is higher for those in the completed high school education category than for women in the other education categories. Unemployment, however, does not appear to increase the probability of entering low-paid employment for women younger than 40 years and is only weakly positive for those aged 40 to 54 years. Interestingly, unemployment increases the probability of entering low-paid employment for all women who have at least completed secondary school.

For men, there is less evidence of heterogeneity in the low-pay no-pay cycle. For the effects of low-paid employment on the probability of entering unemployment, the only significant difference by characteristics is that those in the certificate or diploma education category have a lower average impact of low pay on the probability of entering unemployment. For the effects of unemployment, the only (weakly) significant difference by characteristics is that those with a bachelor's degree have a higher average impact of unemployment on the probability of entering low-paid employment.

Table 6: Dynamic random effects multinomial logit model of labour force status—Allowing for heterogeneity in state dependence—Mean marginal effects (%)

	Males			Females		
	'Unemployed'	Low-paid	High-paid	'Unemployed	Low-paid	High-paid
Age group (Reference category: 21-29*)*						
30-39	4.01***	1.30**	-5.32	2.28**	-0.33	-1.95
40-54	8.76***	2.13***	-10.89	6.00***	-0.99	-5.01
Partnered	-0.11	0.09	0.02	0.80	-1.21	0.42
Have dependent children	4.09***	-0.63	-3.45	14.69***	0.19	-14.87
Age of youngest child	-0.15**	-0.12*	0.27	-1.05***	0.34	0.71
Lone parent	-	-	-	-1.29	-1.12	2.41
NESB immigrant or indigenous	0.95*	3.54***	-4.50	2.71***	1.29*	-4.00
Illness or disability	5.04***	-1.15	-3.89	5.41***	-3.39	-2.02
Educational attainment (Reference category: Less than high school completion*)*						
High school	-3.15	1.00	2.15	0.02	-3.76	3.74
Certificate or diploma	-2.47*	-4.96***	7.43	-3.47**	-1.74	5.21
Bachelor's degree and above	-3.83**	-6.39***	10.22	-4.05*	-6.76***	10.81
Years of work experience	-0.84***	-0.64***	1.48	-1.26***	-0.16***	1.42
Years of work experience^2/10	1.59***	1.24***	-2.82	3.07***	-0.44	-2.63
Section of state (Reference category: Major urban*)*						
Other urban	0.95	0.07	-1.03	0.68	-0.37	-0.31
Bounded locality or rural	4.50***	1.97**	-6.47	2.54*	0.66	-3.20
Wave	-0.02	-0.35***	0.37	-0.09**	-0.64***	0.73
Unemployment rate	0.64***	-0.03	-0.62	0.83***	-0.35	-0.49
Mean 'Partnered'	-0.41***	-0.35***	0.76	0.29	-0.41	0.11
Mean 'Have dependent children'	-0.11	0.00	0.11	-0.79***	0.24	0.55
Mean 'Lone parent'	-	-	-	0.71***	-0.43	-0.28
Mean 'Illness or disability'	0.54***	0.55***	-1.09	0.87***	0.39***	-1.26
Mean 'High school'	0.07	-0.37	0.30	-0.22	-0.07	0.29
Mean 'Certificate or diploma'	0.19	0.22	-0.41	0.10	-0.23	0.13
Mean 'Bachelor's degree and above'	0.12	0.04	-0.16	0.15	-0.84**	0.69
Mean 'Live in other urban area'	-0.06	0.07	-0.01	-0.05	0.32*	-0.27
Mean 'Live in bounded locality or rural area'	-0.39***	0.06	0.33	-0.24	0.23	0.01
'Unemployed' in initial wave	4.48***	2.83***	-7.31	7.74***	4.62***	-12.36
Low-paid in initial wave	-0.50	6.58***	-6.08	-0.23**	9.91***	-9.68
'Unemployed' in *t–1*	12.56***	2.26***	-14.82	23.72***	-2.51	-21.21
'Unemployed' in *t–1*, aged 30-39	2.36*	-0.84	-1.51	3.82***	2.13	-5.96
'Unemployed' in *t–1*, aged 40-54	4.41***	-2.40	-2.02	3.51***	4.08*	-7.59
'Unemployed' in *t–1*, NESB immigrant or indigenous	0.38	-2.13	1.75	2.13	-1.80	-0.33
'Unemployed' in *t–1*, have dependent children	0.14	2.47	-2.61	-3.38***	-1.58	4.96
'Unemployed' in *t–1**age of youngest child	-0.01	0.36*	-0.34	0.47***	-0.22	-0.25
'Unemployed' in *t–1*, illness or disability	0.74	1.11	-1.85	0.94	2.48	-3.42
'Unemployed' in *t–1*, high school	-1.67	0.72	0.94	-1.07	9.20***	-8.13
'Unemployed' in *t–1*, certificate or diploma	-1.08	1.09	-0.01	-1.99	5.79**	-3.79
'Unemployed' in *t–1*, bachelor's degree	-3.40**	5.60*	-2.20	-5.28***	9.13**	-3.85
Low-paid in *t–1*	3.48***	7.51***	-10.98	-0.10	7.86***	-7.75
Low-paid in *t–1*, aged 30 to 39	0.08	2.43*	-2.51	4.57**	0.84	-5.41
Low-paid in *t–1*, aged 40-54	0.42	2.96**	-3.38	5.34***	1.71*	-7.05
Low-paid in *t–1*, NESB immigrant or indigenous	0.15	-2.92***	2.76	-3.31*	0.76	2.55
Low-paid in *t–1*, have dependent children	1.77	0.63	-2.40	-1.31	-1.05	2.36
Low-paid in *t–1**age of youngest	-0.23	0.25	-0.01	0.02	-0.02	0.01
Low-paid in *t–1*, illness or disability	-1.06	-0.25	1.31	0.34	0.24	-0.58
Low-paid in *t–1*, high school	-0.86	3.62**	-2.76	3.49**	4.28***	-7.77
Low-paid in *t–1*, certificate or diploma	-2.46**	1.51	0.96	2.07	2.02*	-4.09
Low-paid in *t–1*, bachelor's degree	-1.44	2.59	-1.15	1.24	4.50**	-5.73
Log likelihood		-5707.648			-8,639.229	
Number of observations		16,613			16,302	
Number of individuals		3,624			3,761	

Note: ***, ** and * respectively indicate statistical significance at the 1, 5 and 10 per cent levels.

Table 7: State dependence for demographic groups: Mean total marginal effect of no-pay and low-pay on subsequent labour force status

	Males			Females		
	'Unemployed' (%)	Low-paid (%)	High-paid (%)	'Unemployed '(%)	Low-paid (%)	High-paid (%)
'Unemployed' in t-1						
Base case	12.56	2.26	-14.82	23.72	-2.51	-21.21
Aged 30 to 39	18.30	0.80	-19.10	32.28	-1.68	-30.60
Aged 40 to 54	22.95	-1.33	-21.62	31.69	0.09	-31.78
NESB immigrant or indigenous	13.40	-0.47	-12.93	28.53	-4.76	-23.77
Has dependent children	–	–	–	15.19	-3.26	-11.93
Has dependent children (youngest aged 10)	–	–	–	24.89	-6.11	-18.78
Completed high school	8.33	3.52	-11.85	21.65	6.39	-28.05
Certificate or diploma	9.87	3.85	-13.72	19.31	3.63	-22.94
Bachelor's degree	4.08	10.18	-14.26	11.59	8.17	-19.76
Low-paid in t–1						
Base case	3.48	7.51	-10.98	-0.10	7.86	-7.75
Aged 30 to 39	3.45	11.51	-14.96	4.53	8.88	-13.41
Aged 40 to 54	3.91	12.36	-16.27	5.26	9.96	-15.22
NESB immigrant or indigenous	3.88	2.53	-6.41	-3.52	8.90	-5.37
Has dependent children	–	–	–	-1.40	6.51	-5.11
Has dependent children (youngest aged 10)	–	–	–	-1.23	6.21	-4.98
Completed high school	2.05	13.49	-15.54	3.19	13.32	-16.51
Certificate or diploma	-0.10	10.07	-9.97	1.89	10.45	-12.34
Bachelor's degree	1.26	11.86	-13.12	0.87	13.66	-14.54

Notes: Reference category is 'high-paid in t-1'. Base case is 'aged 21-29', 'ESB immigrant or non-indigenous native-born', 'no dependent children', 'has not completed high school' and 'no long-term illness or disability'.

Unlike Mosthaf et al. (2009), who find that low pay increases the probability of subsequent inactivity for women with younger children, we find the low-pay no-pay cycle does not vary significantly by the presence of children. However, this may be driven by the fact that our analysis includes only those who are at least marginally attached to the labour force in consecutive periods. To test whether this is the case, we re-estimated our model for women, adding non-employed women not marginally attached to the labour force into the 'unemployed' group. These results are presented in Table 8. In contrast to Mosthaf et al. (2009), it shows that low pay decreases the probability of moving into non-employment in the next year for women with younger children, although this probability is increasing in the age of the youngest child.

Table 8: Dynamic random effects multinomial logit model of labour force status of women—Allowing for heterogeneity in state dependence and including all non-employed in the 'unemployed' category—Mean marginal effects (%)

	'Unemployed' (%)(	Low-paid (%)	High-paid (%)
Age group (Reference category: 21-29*)*			
30-39	5.26***	-1.33	-3.93
40-54	10.76***	-2.59	-8.16
Partnered	2.16	0.14	-2.30
Have dependent children	30.61***	-5.59	-25.02
Age of youngest child	-2.43***	0.67	1.76
Lone parent	-0.77	0.39	0.39
NESB immigrant or indigenous	2.03*	1.08	-3.11
Illness or disability	7.63***	-3.33	-4.30
Educational attainment (Reference category: Less than high school completion*)*			
High school	-1.16	-2.88	4.04
Certificate or diploma	-5.34***	-1.51*	6.85
Bachelor's degree and above	-9.31***	-5.29***	14.60
Years of work experience	-2.07***	0.09***	1.98
Years of work experience^2/10	4.61***	-0.77	-3.84
Section of state (Reference category: Major urban*)*			
Other urban	1.72	-0.13	-1.59
Bounded locality or rural	4.03***	0.34	-4.36
Wave	-0.32***	-0.48***	0.80
Unemployment rate	0.74**	-0.42	-0.32
Mean 'Partnered'	1.02***	-0.57*	-0.45
Mean 'Have dependent children'	-1.65***	0.45	1.20
Mean 'Lone parent'	1.30***	-0.52	-0.78
Mean 'Illness or disability'	1.53***	0.06***	-1.59
Mean 'High school'	-0.05	-0.09	0.13
Mean 'Certificate or diploma'	0.36	-0.18	-0.18
Mean 'Bachelor's degree and above'	0.55	-0.71**	0.16
Mean 'Live in other urban area'	-0.26	0.28	-0.02
Mean 'Live in bounded locality or rural area'	-0.38*	0.21	0.18
'Unemployed' in initial wave	13.07***	2.48***	-15.55
Low-paid in initial wave	-0.53*	8.19***	-7.66
'Unemployed' in *t–1*	31.18***	-4.58	-26.60
'Unemployed' in *t–1*, aged 30-39	2.58**	2.02	-4.60
'Unemployed' in *t–1*, aged 40-54	4.89***	1.82	-6.71
'Unemployed' in *t–1*, NESB immigrant or indigenous	4.47**	-1.39	-3.08
'Unemployed' in *t–1*, have dependent children	-9.82***	-0.40*	10.22
'Unemployed' in *t–1**age of youngest child	1.28***	-0.18	-1.10
'Unemployed' in *t–1*, illness or disability	0.46	2.29	-2.75
'Unemployed' in *t–1*, high school	-2.38	4.78**	-2.41
'Unemployed' in *t–1*, certificate or diploma	-4.62**	4.31*	0.31
'Unemployed' in *t–1*, bachelor's degree	-8.00***	7.63**	0.37
Low-paid in *t–1*	2.83**	5.90***	-8.73
Low-paid in *t–1*, aged 30 to 39	2.11	1.26	-3.36
Low-paid in *t–1*, aged 40-54	2.86	2.30*	-5.16
Low-paid in *t–1*, NESB immigrant or indigenous	-1.00	0.08	0.91
Low-paid in *t–1*, have dependent children	-4.78**	-0.37	5.15
Low-paid in *t–1**age of youngest	0.43**	-0.10	-0.32
Low-paid in *t–1*, illness or disability	1.50	0.38	-1.88
Low-paid in *t–1*, high school	1.44	3.84***	-5.28
Low-paid in *t–1*, certificate or diploma	0.82	1.66	-2.48
Low-paid in *t–1*, bachelor's degree	-0.19	3.57**	-3.38
Log likelihood		-11442.22	
Number of observations		21119	
Number of individuals		4,264	

Note: ***, ** and * respectively indicate statistical significance at the 1, 5 and 10 per cent levels.

A key finding of our analysis is that, for all of the demographic subgroups we examine, low-paid employment unambiguously improves future employment prospects relative to unemployment if these prospects are assessed on the basis of a likelihood of being employed. However, this is not necessarily true if employment prospects are assessed on the basis of a likelihood of moving into *higher-paid* employment. In the case of highly educated men, unemployment and low-paid employment have a similar impact on the likelihood of entering higher-paid employment—a finding that is consistent with that of Mosthaf (2011). For men who have completed secondary schooling but have no further qualifications, low-paid employment actually decreases the chances of entering higher-paid employment by more than unemployment does (by 15.5 percentage points compared to 11.85 percentage points). Thus, if the aim of policymakers is to see people progressing up the wage distribution, for all male subgroups, it is clearly not enough to get them into *any* (low-paid) job. This does not apply to women, however, since all female subgroups have a higher likelihood of moving into higher-paid employment if in low-paid employment than if unemployed.

6. Conclusion

This analysis has used household panel data to estimate the dynamics between unemployment, low-paid employment and higher-paid employment in Australia over the period 2001 to 2011. The effect of lagged labour force status on current labour force status was estimated using a dynamic random effects multinomial logit model to account for unobserved heterogeneity, with Wooldridge's (2005) approach used to address the initial conditions problem.

Consistent with the existing international literature, we find that there is state dependence in both unemployment and low-paid employment in Australia. We also find that there is clear evidence of a low-pay no-pay cycle in the Australian labour market for both men and women. Unemployment increases the likelihood of entering low-paid employment and, in turn, low-paid employment increases the likelihood of entering unemployment. While there is evidence of a low-pay no-pay cycle, we do nonetheless find that low-paid employment in Australia, on average, improves future labour market prospects relative to unemployment; a finding that is consistent with Buddelmeyer et al. (2010), Uhlendorff (2006) and Mosthaf et al. (2009), but is in contrast to Stewart's (2007) finding for jobseekers in the UK over the period 1991 to 1996.

A distinctive feature of our study is the investigation of heterogeneity in the effects of unemployment and low-paid employment on future labour force prospects. We indeed find significant differences in effects across different subgroups of the population. Typically, the young and the better educated face less severe penalties from unemployment and low-paid employment: they suffer less state dependence in unemployment and low-paid employment and are more likely to enter higher-paid employment on average.

Interestingly, in the case of highly-educated men, unemployment and low-paid employment have a similar impact on the likelihood of entering higher-paid employment. For men that have completed secondary schooling but have no further qualifications, low-paid employment actually decreases the chances of entering higher-paid employment by more than unemployment does. Thus, if the aim is to get these men on to a career 'ladder' that sees them progress into higher-paid jobs, it is not sufficient to simply get them into low-paid jobs, since they will most likely remain in these low-paid jobs rather than move into higher-paid employment. This is not the case for women, however, who clearly have a higher likelihood of entering higher-paid employment from low-paid employment than from unemployment, regardless of their age, education level or other characteristics.

Appendix

Table A1: Variable definitions and pooled-sample summary statistics

Variable	Definition	Mean	S.D.
'Unemployed'	Equals 1 if unemployed or marginally attached to the labour force, and 0 if employed.	0.108	0.310
Low-paid	Equals 1 if employed and both hourly and weekly earnings are less than the 120% of the federal minimum wage, and 0 otherwise.	0.118	0.323
Higher-paid	Equals 1 if employed and hourly or weekly earnings are less than the 120% of the federal minimum wage, and 0 otherwise	0.774	0.418
Female	Equals 1 if female and 0 if male.	0.487	0.500
Age group			
21-29	Equals 1 if aged 21-29 years, and 0 otherwise	0.206	0.405
30-39	Equals 1 if aged 30-39 years, and 0 otherwise	0.322	0.467
40-54	Equals 1 if aged 40-54 years, and 0 otherwise	0.471	0.499
Partnered	Equals 1 if legally married or in a de-facto relationship, and 0 if otherwise.	0.611	0.487
Have dependent children	Equals 1 if live with own dependent children, and 0 otherwise. Dependent children are defined as any children under the age of 15 years and any full-time student aged 15 to 24 years resident in the home.	0.686	0.464
Age of youngest child	Age in years of the youngest dependent child of the respondent. Set equal to zero for persons with no dependent children.	5.252	5.909
Lone parent	Equals 1 if in a lone parent household, and 0 otherwise. A lone parent family consists of a parent and at least one dependent child (who cannot have a child or partner of their own). Dependent children are defined as any children under the age of 15 years and any full-time student aged 15 to 24 years resident in the home.	0.082	0.275
Place of birth and indigenous status			
Australia	Equals 1 if born in Australia, and 0 if otherwise.	0.785	0.411
ESB immigrant	'English Speaking Background' immigrant. Equals 1 if born overseas in the UK, Ireland, New Zealand, Canada, the USA or South Africa, and 0 if otherwise.	0.084	0.278
NESB immigrant or indigenous	'Non-English Speaking Background' immigrant or indigenous. Equals 1 if born overseas in a country other than one of the main English-speaking countries or of Aboriginal or Torres Strait Islander origin, and 0 if otherwise.	0.131	0.337
Illness or disability	Equals 1 if has a long-term health condition or disability that prevents work or partially limits type or amount of work, and 0 if otherwise.	0.097	0.295
Educational attainment			
Less than high school completion	Equals 1 if has not completed the final year of high school and does not have a post-school qualification (Certificate Level 3 or higher), and 0 otherwise.	0.228	0.419
High school	Equals 1 if completed high school and does not have a post-school qualification (Certificate Level 3 or higher), and 0 if otherwise.	0.155	0.362
Certificate or diploma	Equal 1 if highest qualification is a Certificate Level 3 or 4 or an undergraduate diploma, and 0 otherwise	0.328	0.469
Bachelor's degree and above	Equals 1 if has a bachelor's degree or higher, and 0 if otherwise.	0.290	0.454
Years of work experience	Number of years spent in employment since leaving full-time education for the first time.	17.364	9.236
Section of state			
Major urban	Equals 1 if lives in major urban area as defined by SOS, and 0 if otherwise.	0.635	0.481
Other urban	Equals 1 if lives in other urban area as defined by SOS, and 0 if otherwise.	0.239	0.427
Bounded locality or rural	Equals 1 if lives in bounded locality or rural area, as defined by SOS, and 0 if otherwise.	0.126	0.331
Wave	Year of wave (2001 to 2011)	6.356	2.903
Unemployment rate	Unemployment rate in state of residence for the month of December	5.032	0.853
'Unemployed' in *t–1*	Equals 1 if unemployed or marginally attached in the previous wave (year), and 0 otherwise.	0.118	0.323
Low-paid in *t–1*	Equals 1 if employed and low-paid in the previous wave (year), and 0 otherwise	0.125	0.331
'Unemployed' in initial wave	Equals 1 if unemployed or marginally attached in the initial wave (year), and 0 otherwise.	0.190	0.392
Low-paid in initial wave	Equals 1 if employed and low-paid in the initial wave (year), and 0 otherwise	0.145	0.352

Note: S.D.—Standard deviation.

Table A2: Dynamic random effects multinomial logit models of labour force status—Alternative low-pay thresholds and definitions of 'unemployment'—Mean marginal effects (%)

	Males			Females		
	'Unemployed'	Low-paid	High-paid	'Unemployed'	Low-paid	High-paid
Panel A: Main estimates						
'Unemployed' in *t–1*	14.46***	4.30***	-18.76	23.72***	1.77***	-25.49
Low-paid in *t–1*	2.02***	12.35***	-14.37	2.89***	11.16***	-14.04
Log likelihood		-5,746.269			-8,616.946	
Number of observations		16,613			16,302	
Number of individuals		3,624			3,761	
Panel B: Low-pay threshold = 150% of the FMW						
'Unemployed' in *t–1*	15.79***	7.87***	-23.66	21.41***	3.69***	-25.11
Low-paid in *t–1*	2.14***	15.31***	-17.46	0.85***	22.44***	-23.29
Log likelihood		-7,711.940			-9,854.639	
Number of observations		16,613			16,302	
Number of individuals		3,624			3,761	
Panel C: Low-pay threshold = 2/3 of the median wage						
'Unemployed' in *t–1*	13.68***	1.19***	-14.87	23.08***	-0.27***	-22.81
Low-paid in *t–1*	3.06***	10.09***	-13.15	3.53***	8.90***	-12.43
Log likelihood		-6,465.617			-8,209.081	
Number of observations		16,613			16,302	
Number of individuals		3,624			3,761	
Panel D: Low-pay threshold = 2/3 of the median wage, narrow definition of 'unemployment'						
'Unemployed' in *t–1*	9.50***	3.38***	-12.87	10.26***	5.93***	-16.19
Low-paid in *t–1*	1.66***	10.51***	-12.17	1.39***	12.45***	-13.84
Log likelihood		-5,186.524			-5,422.285	
Number of observations		15,597			13,592	
Number of individuals		3,424			3,245	
Panel E: Broad definition of 'unemployment' (includes all not in the labour force)						
'Unemployed' in *t–1*	16.59***	3.72***	-20.31	20.26***	0.39***	-20.65
Low-paid in *t–1*	1.73***	12.00***	-13.73	1.68***	9.56***	-11.24
Log likelihood		-6,239.126			-11,583.50	
Number of observations		17,536			21,119	
Number of individuals		3,767			4,264	

Note: ***, ** and * respectively indicate statistical significance at the 1, 5 and 10 per cent levels.

8. References

Ai, C., Norton, E., 2003. Interaction terms in Logit and Probit models. *Economics Letters* 80 (1), 123–129.

Akay, A., 2009. The Wooldridge method for the initial values problem is simple: what about performance?. *IZA Discussion Paper No. 3943*, Bonn, Germany.

Arulampalam, W., Booth, A., Taylor, M., 2000. Unemployment persistence. *Oxford Economic Papers* 52, 24–50.

Buddelmeyer, H., Lee, W., Wooden, M., 2010. Low-paid employment and unemployment dynamics in Australia. *The Economic Record* 86 (272), 28–48.

Cappellari, L., Jenkins, S., 2004. Modelling low pay transition probabilities: accounting for panel attrition, non-response, and initial conditions. *CESifo Working Paper 1232*.

Gong, X,. van Soest, A., Villagomez, E., 2004. Mobility in the urban labor market: a panel data analysis for Mexico. *Economic Development and Cultural Change* 53 (1), 1–36.

Heckman, J., 1981. The incidental parameters problem and the problem of initial conditions in estimating a discrete time-discrete data stochastic process. in Manski, C. and McFadden, D. (Eds.), S*tructural Analysis of Discrete Data with Econometric Applications*, MIT Press, Cambridge, Massachusetts.

Knights, S., Harris, M., Loundes, J., 2002. Dynamic relationships in the Australian labour market: heterogeneity and state dependence. *The Economic Record* 78 (242), 284–98.

McCormick, B. 1990. A theory of signalling during job search, employment efficiency and 'stigmatized' jobs, *Review of Economic Studies*, 57, 299–313.

Mosthaf, A., 2011. Low-wage jobs – stepping stones or just bad signals? *IAB Discussion Paper No. 11/2011*, Nuremberg, Germany.

Mosthaf, A., Schank, T., Schnabe, C., 2009. Low-wage employment versus unemployment: which one provides better prospects for women? *IZA Discussion Paper No. 4611*, Bonn, Germany.

Mundlak, Y., 1978. On the pooling of time series and cross section data. *Econometrica*, 46, 69–85.

Smith, R., Vavricheck, B., 1992. The wage mobility of minimum wage workers. *Industrial and Labour Relations Review* 46 (1), 82-88.

Stewart, M., 2007. The inter-related dynamics of unemployment and low pay. *Journal of Applied Econometrics*, 22 (3), 511–531.

Stewart, M., Swaffield, J., 1999. Low pay dynamics and transition probabilities. *Economica*, 66 (261), 23–42.

Stewart, M., Swaffield, J., 1997. The dynamics of low pay in Britain. in P. Gregg (ed.), *Jobs, Wages and Poverty: Patterns of Persistence and Mobility in the New Flexible Labour Market*, Centre for Economic Performance, London.

Uhlendorff, A., 2006. From no pay to low pay and back again? A multi-state model of low pay dynamics. *IZA Discussion Paper No. 2482*. Bonn, Germany.

van den Berg, G., van Ours, J., 1996. Unemployment dynamics and duration dependence. *Journal of Labor Economics* 14 (1), 100–125.

Watson, N., Wooden, M., 2004. The HILDA survey four years on. *Australian Economic Review* 37 (3), 343–349.

Wooldridge, J., 2005. Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity. *Journal of Applied Econometrics* 20, 39–54.