



Reserve Bank of Australia

RESEARCH DISCUSSION PAPER

Employment Composition: A Study of Australian Employment Growth, 2002–2006

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Abstract

This paper uses data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey to examine whether there was a change in employment rates for people with ‘low employment’ characteristics between 2002 and 2006, which was a period of strong employment growth. In particular, it estimates the relationships between employment and personal and household characteristics using a binomial logit model, with a comparison of the coefficients in 2002 and 2006 providing tentative evidence of a broadening of employment over this period.

To explore this further, the paper examines whether the broadening in employment reflects an improvement in the relative employment prospects of the unemployed or of those outside of the labour force (which includes the ‘marginally attached’ and those who can be more strictly described as being ‘not in the labour force’). Estimates of a multinomial logit model imply that the improvement in the relative employment prospects of those outside of the labour force was the more important effect. In particular, between 2002 and 2006, the concentration of ‘low employment’ characteristics decreased among people who are only marginally attached and those not in the labour force, suggesting that the strong employment growth was especially beneficial for these groups. In contrast, the concentration of ‘low employment’ characteristics in the unemployment pool was broadly unchanged.

JEL Classification Numbers: C21, J21; J64

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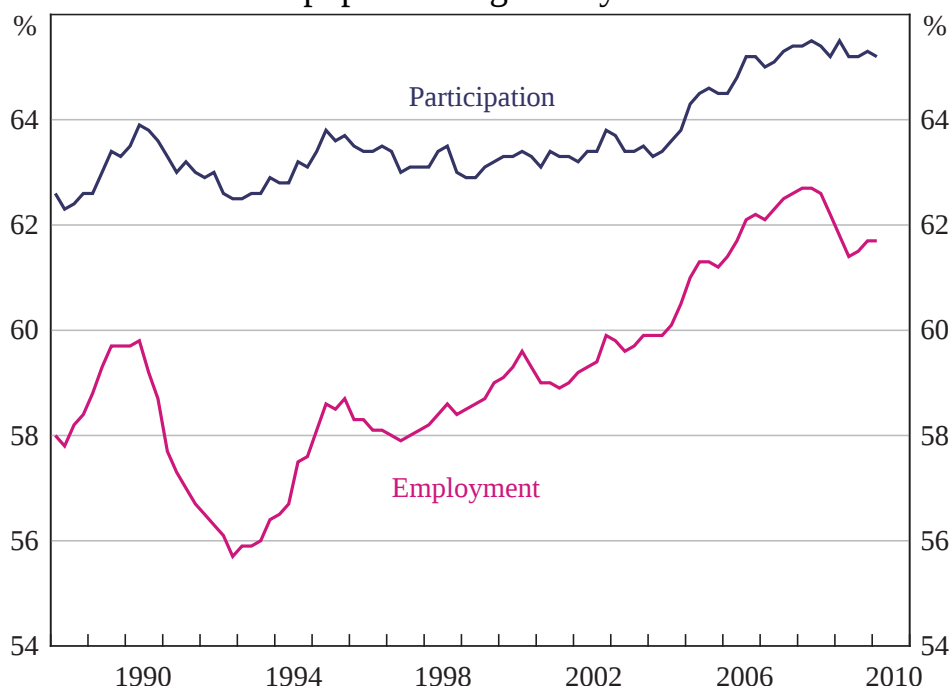
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Jeremy Lawson and Crystal Ossolinski

1. Introduction

It has been well established that the distribution of employment changes over the business cycle (for example, see Okun 1973, Borland 2000 and Bils, Chang and Kim 2007). Time series studies show that during upswings, those with lower skills and a lower propensity to supply labour tend to experience proportionately larger increases in employment rates than other segments of the population (and *vice versa* during downturns). This paper takes a somewhat different approach, using longitudinal data on individuals to examine how the relationships between personal characteristics and labour market status changed in Australia over a period of strong employment growth (Figure 1).

Figure 1: Employment and Participation Rates
Ratio to the population aged 15 years and above



Source: ABS

The paper uses data from the Household, Income and Labour Dynamics in Australia (HILDA) Survey, which has been conducted annually since 2001. The survey asks participants for information on a range of personal characteristics and employment status over time. Because some of the key data for our purposes (such as wealth) are only available for 2002 and 2006, we restrict our analysis to a comparison of these two years. Even so, over this period the rate of employment increased steadily and substantially, making it relevant to examining the effect of strong employment growth on people with varying degrees of attachment to the labour market (that is, the unemployed, the marginally attached and those more strictly defined as being ‘not in the labour force’).

The paper is structured as follows. In Section 2, we review existing studies of the relationship between labour force status and personal characteristics, and how this changes as the aggregate employment rate increases. In Section 3, we introduce the data and provide graphical evidence that the employment rates across different characteristics became more evenly distributed between 2002 and 2006. In Section 4, we estimate an econometric model that relates the probability of being employed (versus not employed) to various personal characteristics, and test for a change in these relationships over time. We then extend this analysis in Section 5 by focusing on the relationships between personal characteristics and the probability of being unemployed, marginally attached or not in the labour force (NILF). Again, we test whether these relationships have changed over time. We conclude in Section 6.

2. A Look at the Literature

The literature suggests that a cyclical increase in the employment rate will be particularly beneficial for those groups with low productivity or a low propensity to supply labour – that is, people with relatively low employment rates.

There are several reasons why both the demand for and supply of labour by low-skilled workers tend to fall disproportionately during a downturn (and *vice versa* during an expansion). First, in a downturn employers may choose to hoard workers with more firm-specific human capital – that is, those who are likely to be more highly skilled. Second, a flat unemployment benefit creates a higher relative

replacement ratio for low-productivity (and hence low-wage) workers (Borland 2000), reducing their incentive to participate if expected wage growth slows. Third, higher-productivity workers have an incentive to remain employed, owing to their comparative advantage in market work, and during a downturn they are more likely to gain a lower-paid job following separation, thereby crowding out low-productivity workers during an economic slowdown (Okun 1973; Blank 2000).¹ Concurrently, workers with a comparative advantage in non-market work are relatively more inclined to leave, or stay out of, the labour force when wage growth slows in a downturn (Bils *et al* 2007). Finally, if wage growth slows, the minimum wage rate can become binding for low-productivity workers, encouraging employers to lay off such workers.

These hypotheses are supported by empirical studies, which generally find that employment becomes more broadly distributed in periods of high employment growth. The main body of empirical studies use time series data and focus on the relative cyclicalities of unemployment rates by skill level, industry, average wage or education. Borland (2000) presents data for Australia that show that employment rates increase by more for low-skilled cohorts (proxied by age, education and occupation) when the aggregate employment rate rises. Using a long panel dataset from the United Kingdom, Bils *et al* (2007) also find low-productivity workers have much more cyclical unemployment rates. Gray, Heath and Hunter (2002) adopt a cross-sectional approach using Australian data. They attempt to identify a causal effect of the local unemployment rate on the transition probabilities into employment of two groups with different propensities to supply labour. They find only tentative signs that a higher unemployment rate has a different effect on the transition rates of men and women, but note that this result may be because the survey occurred during a period of volatile employment growth.

1 During the period of rising employment over the past decade, Australian Bureau of Statistics (ABS) data suggest that job-to-job churn and the rate of voluntary separation both increased. This is consistent with the idea that higher-skilled or more productive workers take low-productivity jobs when employment rates are low, and then ‘trade up’ as new high-productivity jobs are created and employment is expanding, thereby creating vacancies for those with lower skills to fill.

However, these studies do not establish whether there is a change in the relative rates of unemployment, marginal attachment or participation across individuals with different personal characteristics. This is an important focus of this study.

Our study does not probe a causal relationship between changes in the aggregate employment rate and the distribution of employment. This would be difficult because over the episode of rising employment relevant to our study, structural or long-term influences are also likely to have affected the relative employment rates of different groups. First, there may have been a relative shift in labour demand owing to changing industry composition or other factors.² Second, the deregulation of labour markets over recent decades may have increased flexibility in minimum employment conditions and wages, increasing the relative demand for lower-skilled labour. Finally, the demand for, and supply of, labour by different cohorts may have been influenced by demographic factors and changes in income tax and welfare eligibility. Nevertheless, the period provides a useful case study.

3. Data

In this paper, we estimate an econometric model that links individuals' employment status to a range of personal characteristics, and then test whether these relationships have changed over time. To do this, we use unit-record data on a large number of individuals from the HILDA Survey. Although it covers a relatively short time period, the HILDA Survey provides a wider range of information than that contained in the ABS Labour Force Survey (LFS) or in the Household Expenditure Survey.³

2 Nickell and Bell (1995) examine data for a range of countries including Australia and conclude, in contrast to other studies, that the relative unemployment rate of the unskilled generally fell while aggregate unemployment rates rose during the early 1990s recession. They suggest a change in relative labour demand favouring the less-skilled caused this shift.

3 Developments reported by the HILDA Survey are also generally consistent with the LFS: the employment rate in HILDA increased from 62.0 per cent to 64.7 per cent between 2002 and 2006, compared to an increase from 59.4 per cent to 62.1 per cent in the LFS. A drawback of using the HILDA dataset for our study is that recent immigrants, who account for a large proportion of recent increases in labour supply, are under-represented.

The dependent variable in our analysis is the current labour force status of the individual in the week prior to the interview for the HILDA Survey, which occurs each year around August and September. The definitions of employment, unemployment, marginal attachment and not in the labour force are identical to those used for the LFS.

The right-hand-side variables include a range of characteristics described in the literature as being relevant to employment status – that is, they influence either the supply of labour by an individual or the demand for the type of labour that might be provided by that individual. The literature in this area is extensive; for example see Carroll (2006) on the characteristics of the unemployed, Gray *et al* (2002) on the characteristics of the marginally attached, and Belkar, Cockerell and Edwards (2007) for a study of those not in the labour force. Borland (2000) and Le and Miller (2000) provide a review of earlier Australian studies. A robust finding of the literature is that factors likely to influence an individual's productivity, such as education, occupation and age, are positively related to the probability of employment, while factors that potentially constrain supply, such as having young children or alternative income sources, are associated with a low probability of employment.

In addition to these personal characteristics, we relate employment status to two variables capturing individuals' labour market history.⁴ One is a measure of recent employment experience and the other a measure of lifetime employment experience. Recent employment experience is measured as the percentage of the previous financial year spent in employment. Defined this way, the current labour force status does not overlap with recent employment experience. Lifetime employment experience is measured as the percentage of time spent in employment since finishing full-time education. Besides capturing the potential effect of 'scarring' on future labour market outcomes, previous outcomes may also imply something about an individual's unobserved productivity level and her propensity to supply labour.⁵ Including explanators that capture past employment

4 This places our model in the class of inertia models, which include variables measuring past employment experience to capture unobserved characteristics; see Le and Miller (2000).

5 Scarring refers to the negative effects of a spell outside employment, which can be long-lasting (Gregg 2001).

activity, therefore, controls for the unobserved heterogeneity across individuals, reducing the potential bias in the estimates of the coefficients on other variables.⁶

Continuous variables such as wealth and labour income appear to have a non-linear relationship with employment status (see Figure 2). To avoid specifying the functional form of the non-linear relationship, we converted all continuous variables into categorical dummies. The same general story emerges from the data if instead the models are specified using continuous variables and polynomial terms are included to account for non-linear relationships.

Following Belkar *et al* (2007), household income is defined as total income earned by all members of the household (including pension income) less the wages of the individual in question. It measures the income a person can access without working, assuming that the household pools the income of all members.⁷ Net household wealth is calculated using information from the wealth modules in 2002 and 2006 and is defined as total household assets less total household debt. The debt-to-income ratio is total household debt from the wealth module divided by household income as described above. Defined this way, it measures the ability of the household to service its debts if the individual in question does not work.

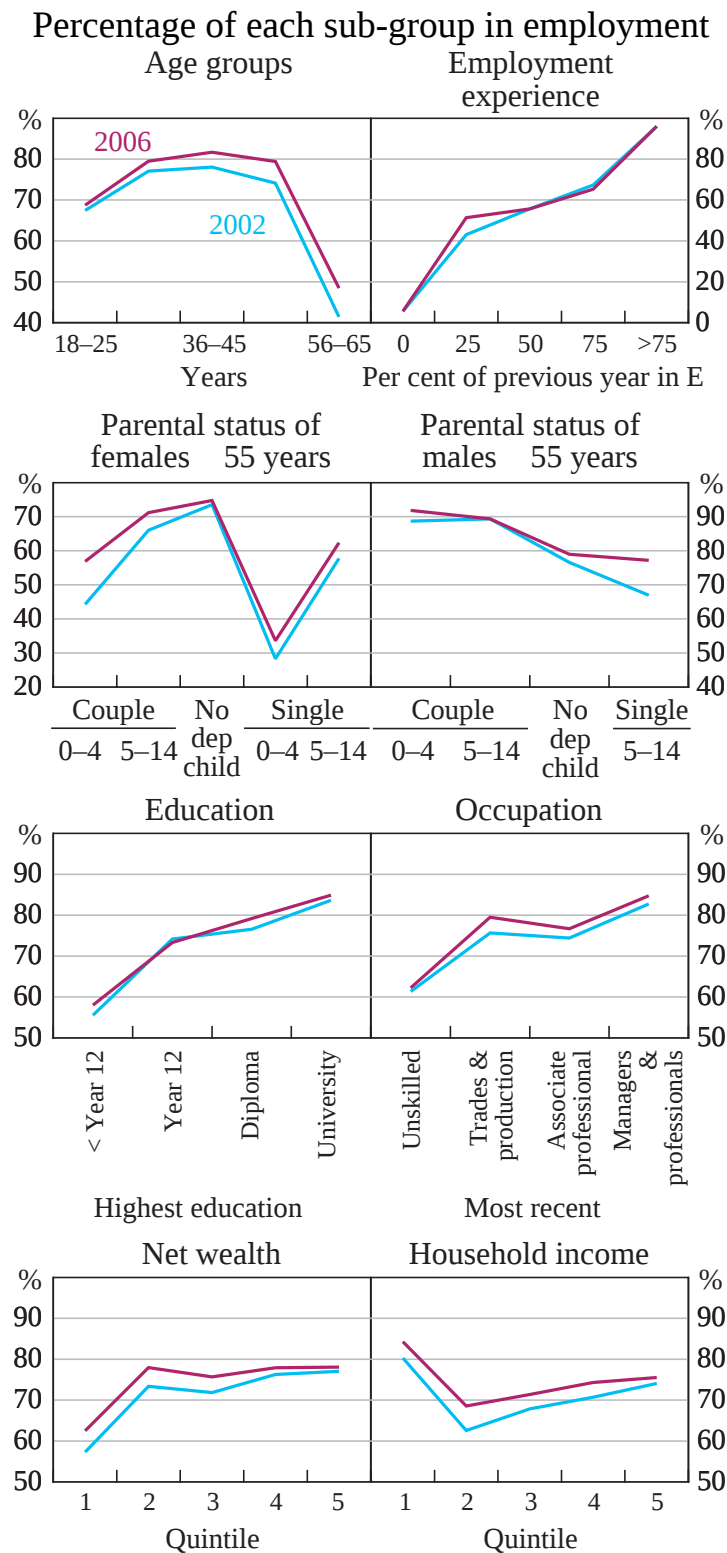
Our sample consists of 17 606 individuals: 8 952 in 2002 and 8 654 in 2006. We restrict this further by considering only individuals aged 18 to 65 years (losing 5 227 observations), those who have had at least some work experience (losing 244 observations) and those with missing information for other explanators (losing 2 869 observations). Hence our results are conditional upon being of working age and having been previously employed.

6 An alternative approach is to exploit the panel aspect of the HILDA data using a fixed-effects model. The main advantage of the fixed-effects model is that it controls for the effect of unobserved characteristics, potentially reducing omitted variable bias. However, the fixed-effects model cannot include any time-invariant explanators, such as sex, and the coefficient estimates may be biased if a lagged dependent variable is included. Further, any selectivity bias introduced by non-random attrition and measurement error in the explanators is exacerbated. We prefer the inertia model, which provides some control for unobserved characteristics and allows us to include time-invariant explanators.

7 It also gives an imperfect indicator of the partner's employment status, which may influence an individual's labour supply (Le and Miller 2000; Breunig, Cobb-Clark and Gong 2005).

The bivariate relationships between some key characteristics and the propensity for employment are displayed in Figure 2 for 2002 and 2006. From this we highlight two general results. First, there is clear evidence that certain characteristics are more strongly associated with employment: prime-aged workers are more likely to be employed than those aged over 55 years; individuals with higher education and managers and professionals are more likely to be employed than others; and women with older children or no dependents are more likely to be employed than those with younger children. In part, this reflects variation in the willingness of people at different stages of life to participate in the workforce, but it is also likely to reflect stronger demand for more productive individuals.

The second result, and our primary interest, relates to how these relationships have changed between 2002 and 2006. Across all characteristics shown here, the propensity for employment increased, reflecting the higher aggregate employment rate in 2006. Also, the relative propensity for employment across groups shows much the same pattern; for example, those with less than a high school education had lower employment rates in both 2002 and 2006. However, in most cases, characteristics associated with lower-than-average employment rates in 2002 tended to be associated with larger increases in employment between 2002 and 2006. In other words, there appears to have been a broadening of employment between 2002 and 2006, consistent with existing time series evidence regarding periods of economic expansion.

Figure 2: Employment Rates by Characteristic

Notes: Sample includes people aged between 18 and 65 years; data are weighted; household income refers to all income earned by household members including pensions and excluding the labour income of the individual in question

Source: HILDA Survey, Release 6.0

4. Comparing the Employed to those Not-employed

4.1 Methodology

The graphical comparison shows that those groups with the lowest employment rates in 2002 tended to experience the largest increase in employment rates between 2002 and 2006. In order to test this finding more systematically, we must estimate the empirical relationship between employment and personal characteristics. The standard way to do this using unit-record data is to estimate a discrete ‘choice’ model in which individuals can either be employed or not employed depending on their personal characteristics. We leave an examination of the link between being in one of the three different pools of those not-employed – the unemployed, marginally attached and those not in the labour force – and personal characteristics until Section 5.

We proceed in two steps. First, we estimate binomial logit models for 2002 and 2006 separately, as well as for data pooled over both 2002 and 2006. The binomial logit model defines the probability of an individual being in employment as a function of his or her characteristics:

$$P(Y = E|X) = \frac{e^{X\beta^E}}{1 + e^{X\beta^E}} \quad (1)$$

where: $Y = E$ indicates employment (the alternative is not-employed); X is a vector of dummy variables (x_j) indicating personal characteristics; and β^E is a vector of coefficients (the superscript E indicates that these coefficients are relevant to the propensity to be employed).⁸

We present our results in terms of the odds ratio of employment associated with each characteristic (OR^{x_i}). The *odds* measures the probability of the person being

⁸ We estimate our model using the *logit* and *mlogit* commands in Stata 10 without weighting the data; the qualitative story is robust to estimation with or without weighting. The HILDA sample is fairly representative of the population across the variables we include. Further, attrition between waves 2 and 6 appears to have occurred at similar rates across characteristics, so that the sample should not have become unrepresentative over time.

in employment relative to the probability of the person being not employed conditional on the person's characteristics. The *odds ratio* associated with each characteristic is the ratio of two odds: the odds that an individual who has the characteristic in question but otherwise exhibits the 'base' set of characteristics is in employment; and the odds that an individual who exhibits the full 'base' set of characteristics is in employment. Mathematically:

$$OR^{x_i} = \frac{P(Y = E | x_i = 1, x_{j \neq i} = 0) / [1 - P(Y = E | x_i = 1, x_{j \neq i} = 0)]}{P(Y = E | x_i = 0, x_{j \neq i} = 0) / [1 - P(Y = E | x_i = 0, x_{j \neq i} = 0)]} = e^{\beta_{x_i}^E} \quad (2)$$

An odds ratio greater than 1 indicates that the odds of being in employment are higher for a person who exhibits that characteristic than for a person who is otherwise identical but does not exhibit that characteristic. In this way, we can identify which characteristics are associated with a higher probability of being in employment.

The second step is to formally test for changes in the coefficients over time. We estimate the binomial logit model over the pooled data and interact a 2006 dummy with each of the explanatory variables. For those dummies that are statistically significant, we conclude that the relationship between the relevant characteristic and employability had changed over time. We also test whether there was any statistically significant change in the overall relationship between characteristics and employment by testing the null hypothesis that all the dummy variables are jointly equal to 1 (in which case the regression results for 2006 would not be statistically different from the results for 2002).

4.2 Average Distribution of Employment over 2002 and 2006

Before discussing the change over time, it is worth reviewing the average distribution of employment over personal characteristics that we determine from the regression over the pooled data. As discussed above, an odds ratio greater than 1 indicates that the characteristic is associated with a higher probability of being in employment (compared to the base characteristic) and *vice versa* for an odds ratio less than 1. As expected, characteristics typically associated with high labour supply or high productivity raise the probability of being in employment

(Table 1). In particular, the probability of being in employment is higher for younger workers, partnered males, individuals with more work experience, and those with a high level of education and a higher occupation status. In contrast, the probability of being employed is lower for those aged over 45 years, women with young children, those with less than high school education, production and unskilled workers, migrants from non-English-speaking backgrounds and people with very little work experience. Our model predicts 93 per cent of the observations and has a pseudo R-squared of 0.67.

A few results are worth discussing in more detail.

One of the key predictors of employment status is work history. Excluding these variables, only 82 per cent of observations are correctly predicted and the pseudo R-squared falls to 0.29. As expected, the greater the proportion of the previous financial year (or lifetime) spent in work, the greater the likelihood that that individual is employed.

Financial incentives are also strongly related to the probability of being employed. Theory suggests that a higher level of household income may decrease the financial incentive to work. Consistent with this we find a negative relationship between the probability of being employed and household income. Similarly, the positive relationship between the debt-to-income ratio and the probability of being in employment indicates a strong role for financial incentives.⁹

⁹ Also see Belkar *et al* (2007) who attempt to identify a causal effect of increased debt-to-income ratios on the labour supply of women.

Table 1: Binomial Logit (*continued next page*)Odds ratio of employment relative to non-employment relative to base case^(a)

	Pooled	2002	2006	Diff ^(b)	Pooled excl history ^(c)
2006 (vs 2002)	1.0				1.2***
Age (vs 36–45 years)					
18–25 years	1.2	1.1	1.2		1.6***
26–35 years	0.9	1.1	0.8		1.1
46–55 years	0.7***	0.7**	0.7**		0.7***
56–65 years	0.4***	0.4***	0.4***		0.2***
Birth country (vs Australia)					
English-speaking	1.0	0.9	1.1		1.0
Non-English-speaking	0.7***	0.7***	0.8		0.5***
Education (vs university)					
Diploma or certificate	0.8**	0.6***	1.0	**	0.7***
High school	0.9	0.8	1.0		0.7***
Less than high school	0.6***	0.5***	0.8	**	0.5***
Occupation (vs professional)					
Associate professional	0.9	0.9	0.8		0.8***
Trade	0.9	1.0	0.9		0.7***
Production	0.6***	0.7*	0.6***		0.5***
Unskilled	0.8	0.8*	0.9		0.5***
Father's occupation (vs professional)					
Associate professional	1.1	0.9	1.3*	*	1.1
Trade	1.3**	1.5***	1.1		1.2**
Production	1.2**	1.4**	1.0		1.2***
Unskilled	0.8	0.8	0.9		0.9
Mother's employment status (vs employed)					
Not employed	1.1	1.2	1.0		1.1***
Student status (vs not student)					
Enrolled full-time	0.9	1.0	0.8		0.5***
Finished studies					
1–2 years ago	1.4**	1.6	1.3		0.9
Time in work in previous year (vs 100 per cent)					
0 per cent	0.0***	0.0***	0.0***		na
1–25 per cent	0.0***	0.0***	0.0***		na
26–50 per cent	0.0***	0.0***	0.1***	*	na
51–75 per cent	0.1***	0.0***	0.1***		na
76–99 per cent	0.1***	0.1***	0.1***		na
Time in work since school (vs more than 50 per cent)					
Less than 50 per cent	0.8**	0.9	0.7**		na

Table 1: Binomial Logit *(continued next page)*Odds ratio of employment relative to non-employment relative to base case^(a)

	Pooled	2002	2006	Diff ^(b)	Pooled excl history ^(c)
Health condition (vs healthy)					
Has health condition	0.5***	0.5***	0.6***		0.3***
Housing tenure (v mortgagee)					
Outright owner	0.9	0.9	0.9		0.8***
Renter	1.3*	1.1	1.4*		1.6***
Family status (vs male couple with no child)					
Female	0.9	0.8*	1.0		0.7***
Single with no child	1.0	1.1	0.8		0.7***
Couple, male, child 0–4 years	1.3	1.4	1.2		1.3**
Couple, male, child 5–24 years	1.5***	1.6**	1.4		1.9***
Couple, female, child 5–24 years	1.1	1.1	1.1		0.8***
Couple, female, child 0–4 years	0.3***	0.3***	0.3***		0.1***
Single, child 0–14 years	0.9	1.0	0.8		0.4***
Has non-resident child	1.4**	1.5*	1.4		0.9
Net wealth (vs top quintile)					
1st quintile	0.5***	0.6**	0.5***		0.2***
2nd quintile	0.7**	0.8	0.7*		0.4***
3rd quintile	0.7***	0.7**	0.7**		0.6***
4th quintile	0.8*	0.7*	0.9		0.8**
Income less own labour income (vs top quintile)					
1st quintile	1.7***	1.2	2.2***	**	2.9***
2nd quintile	1.2*	1.1	1.4*		1.4***
3rd quintile	1.3**	1.2	1.3*		1.3***
4th quintile	1.3**	1.1	1.4**		1.4***
Debt-to-income ratio (vs above 3)					
0	0.5***	0.5***	0.5***		0.2***
0–1	0.6***	0.6***	0.7***		0.4***
1–3	0.8**	0.7*	0.9		0.6***
Remoteness (vs capital city)					
Major city	1.1	1.1	1.1		1.0
Rural	1.0	1.1	0.9		1.0

Table 1: Binomial Logit (continued)Odds ratio of employment relative to non-employment relative to base case^(a)

	Pooled	2002	2006	Diff ^(b)	Pooled excl history ^(c)
State or Territory (vs NSW)					
Victoria	0.9	1.0	0.9		1.1
Queensland	0.9	0.9	0.9		0.9
South Australia	1.1	0.9	1.1		1.1
Western Australia	1.0	1.0	1.0		0.9
Tasmania	0.8	0.5**	1.2	**	0.9
Northern Territory	2.6*	7.8***	1.0	**	2.7***
ACT	1.2	0.8	1.5		1.2
Imputed (vs not imputed)	1.4***	1.4***	1.5***		1.6***
Memo items:					
Number of observations	17 606	8 952	8 654		17 606
Likelihood ratio test (p-value)	0.00	0.00	0.00		0.00
Pseudo R ²	0.67	0.69	0.65		0.29
Predictive power ^(d)	93.1	93.3	93.2		81.6
Wald test of the full set of 2006 dummies equal to zero (p-value) ^(b)				0.15	

Notes: (a) Base case is indicated in brackets for each group of categorical variables. Standard errors calculated using White's robust variance estimator. *, ** and *** indicate significance at the 10, 5 and 1 per cent levels respectively.

(b) Results from a regression of employment status on characteristic type and a set of dummies that interact characteristics with the year 2006. Null hypothesis is that the coefficient on the 2006 characteristic is equal to zero, that is, no difference in the relative probability of employment between 2006 and 2002 for that characteristic compared to the base case.

(c) The same regression, but excluding the work history variables.

(d) Percentage of observations correctly predicted, where the rule is to predict employment if probability of employment for that individual is greater than 50 per cent, and predict not-employed otherwise.

4.3 Comparing 2002 and 2006

Having identified the characteristics associated with employment, we now examine whether those who are not employed have become more or less similar to the employed, and which characteristics are central to understanding that change. Including a full set of 2006 interaction dummies in the pooled regression does not alter the fit of the model, the pseudo R-squared is 0.67, and 93 per cent of observations are correctly predicted. Very few interactive terms are found to be significant at the 10 per cent level, and a Wald test that all interactive terms are equal to zero cannot be rejected at the 10 per cent level. For each characteristic group, we test the joint significance of the 2006 interactive dummies – only for two categories (father's occupation and regional location) are the dummies jointly different from zero at the 10 per cent significance level (see Appendix Table B1). Thus, the change in the distribution over time appears to be minimal.

Nevertheless, in a number of cases, the point estimates do change in an economically meaningful way. Further, these changes are consistent with those in Figure 2. The characteristics least associated with employment in 2002 were relatively more likely to be associated with employment in 2006. In other words, there appears to have been some broadening of employment across people with the lowest employment rates in 2002.

Notably, the estimated odds ratios across all categories of employment experience (where the base case is 100 per cent employment in the previous year) were higher in 2006 than in 2002. This implies that the link between previous employment experience and current employment status, though still strong, was somewhat weaker in 2006 than in 2002. The effects of this phenomenon can be seen directly in the fall in the proportion of the sample who were long-term unemployed (over 24 weeks) from 1.0 per cent to 0.6 per cent. This result supports the idea that during an employment expansion the average level of recent work experience in the population rises.¹⁰

¹⁰ In the inertia model, past work experience also proxies for unobservable characteristics. Therefore, this result may suggest that the relationship between 'employability' and the unobserved individual characteristics had weakened between 2002 and 2006.

Other low employment groups also appeared to benefit in a relative sense from increased labour demand. The odds ratios of employment for the unskilled, those with lower education and migrants from non-English-speaking countries were all higher in 2006 than in 2002. In the case of education, the increases in the odds ratios of employment associated with less-than-high-school and diploma-level education are significant at the 10 per cent level.

One dimension in which the low-employment groups were not found to have benefited is across the net wealth categories; the odds ratios of employment fell for the two bottom net wealth quintiles. However, it is difficult to interpret this change because of the dependence of wealth on employment.

5. Unemployment, Marginal Attachment and Not in the Labour Force

5.1 Multinomial Logit Model – Methodology

The binomial logit model above treats all people not employed as similar. However, ‘not employed’ consists of three separate groups with potentially quite different characteristics: the unemployed, the marginally attached and those not in the labour force. To look at how the mix of individuals in each of these pools has changed over time we repeat the analysis by splitting the not-employed into the three groups and comparing each to the employed group using a multinomial logit model.

We treat the marginally attached (individuals wanting work but either unavailable in the reference week or with no search activity) as being separate to the group of individuals who are not in the labour force (that is, not available and not searching for work) for several reasons: the average characteristics exhibited by the marginally attached can differ significantly from those not in the labour force; their transition rates into employment and unemployment are higher than for the group of those not in the labour force (Gray *et al* 2002); and they form a group twice as large as the unemployed pool.

We follow the same procedure as for the binomial logit in Section 4. We first estimate the multinomial logit model to determine which characteristics are associated with each of the not-employed states in 2002, in 2006 and on average over the two years (using pooled data). We then run a formal test for a change in the distribution over time by interacting a 2006 dummy variable with each characteristic. If the dummy variables are jointly different from 1, then the relationships between the not-employed state in question and individual characteristics will have changed between 2002 and 2006.

For each alternative labour force state, the multinomial logit estimates the probability that a person with a given set of characteristics is a member of that state. For example, for unemployment this is:

$$P(Y = U|X) = \frac{e^{X\beta^U}}{1 + e^{X\beta^U} + e^{X\beta^{MA}} + e^{X\beta^{NILF}}} \quad (3)$$

X is the same vector of dummy variables indicating personal characteristics as used in Section 4 and β^Y is now the vector of coefficients associated with labour force status $Y = U, MA$ or $NILF$ – for unemployed, marginally attached or not in the labour force, respectively – rather than employment, E . Employment is now set as the base case, so that $e^{X\beta^E}$ is normalised to equal 1. Doing this allows us to calculate the relative probability of being in one of three labour force states ($Y = U, MA$ or $NILF$) rather than in employment for a given set of characteristics, called the *relative risk* (of that particular state). For unemployment this would be:

$$\frac{P(Y = U|X)}{P(Y = E|X)} = e^{X\beta^U} \quad (4)$$

Using this information we can then calculate a *relative risk ratio* (RRR) of unemployment for characteristic x_i . This measures the relative risk of being unemployed for a person who exhibits that particular characteristic (but in all other ways has the set of base characteristics) compared to the relative risk of being unemployed for a person who has the full set of base characteristics:

$$RRR^{x_i^U} = \frac{P(Y=U|x_i=1, x_{j \neq i}=0) / P(Y=E|x_i=1, x_{j \neq i}=0)}{P(Y=U|x_j=0) / P(Y=E|x_j=0)} = \frac{e^{\beta_i^U x_i + \dots + \beta_i^U \cdot 1 + \beta_k^U x_k}}{e^{\beta_i^U x_i + \dots + \beta_i^U \cdot 0 + \beta_k^U x_k}} = e^{\beta_i^U} \quad (5)$$

With employment as the base case, the RRR of unemployment tells us how each characteristic affects the probability of being in unemployment rather than in employment. For example, if the relative risk ratio associated with poor health in the marginal attachment regression is 2 then an individual with poor health is twice as likely to be marginally attached than employed compared to someone who is healthy (which is the base for this characteristic). There is a separate RRR for each characteristic for each of the labour force states, so a characteristic may have a high RRR with respect to unemployment but a low RRR with respect to not being in the labour force. This feature of the multinomial logit allows us to gather a significant amount of information about how each characteristic is related to labour force status.

5.2 Comparing Characteristics across Not-employed States

In order to gauge how strongly each characteristic is associated with each not-employed state, we can directly compare the size of the RRR for the same characteristic across the unemployment, marginal attachment and not-in-the-labour-force regression results. This is possible because employment is used as the common base case. For example, the RRR of unemployment for those aged 56–65 years is not significant, whereas the RRR of not being in the labour force for those aged 56–65 years is 5.0 and significantly different from 1 (in the pooled regression). Together, these results indicate that along this dimension the not-in-the-labour-force group are very different to the employed group, whereas the unemployed are not very different. Looking across all the pooled results in Tables 2A–C, we find that the unemployed are the most similar to the employed – for most characteristics the RRR of unemployment is closest to 1 for the unemployment regression – while the not-in-the-labour-force group is the least similar to the employed group. The marginally attached are somewhere in between.

The results also confirm that the characteristics associated with each labour force status are different from each other, in ways that we might generally expect

(Tables 2A–C). Almost by definition, the unemployed will have a relatively high propensity to supply labour but may face a relatively low demand for the skills or experience they have to offer. Consistent with this, our results show that unemployment tends to be associated with males, unskilled or production workers and those with a diploma-level of education (Table 2A). Also, unemployment is strongly related to low net wealth and a lack of recent labour market experience.¹¹

In contrast, not being in the labour force is associated with characteristics that generally indicate a lower propensity to supply labour: older people; women (particularly with young children); high household income and low debt levels; and a lower level of education. Not being in the labour force appears unrelated to net wealth (Table 2B). The finding that women are more likely to not be in the labour force, even if they do not have dependent children, may reflect the tendency for women to retire earlier than men. The fact that those people with less than high school education are more likely to not be in the labour force is consistent with the idea that the decision to increase education is closely related to an individual's willingness to be in the labour force.

Those in marginal attachment have features in common with both the unemployed and not-in-the-labour-force pools. In particular, marginal attachment tends to be associated with older workers, women with young children, single parents, those people with less than a high school education, migrants from non-English-speaking countries, higher levels of household income and low debt-to-income ratios (Table 2C). Like unemployment, it is negatively related to net wealth.

From this, three key groups appear prominent in the group of marginally attached individuals: those aged over 45 years; single parents; and partnered women with children. Their status suggests that for some reason these groups typically do not undertake much job search or find it difficult to begin work immediately, yet report that they would like to work. Understanding the behaviour of these groups requires a better knowledge of job search activity and the transition from non-work to work.

¹¹ An insignificant coefficient on youth in the unemployment regression is somewhat surprising given the relatively high rate of unemployment for this category. This result is partly due to the exclusion of those who have never worked from our sample, as well as the fact that net wealth is highly correlated with age.

Table 2A: Multinomial Logit Results of Unemployment Regression*(continued next page)*RRR of unemployment relative to employment^(a)

	Pooled	2002	2006	Diff ^(b)
2006 (vs 2002)	0.9			
Age (vs 36–45 years)				
18–25 years	1.2	1.2	1.3	
26–35 years	1.1	1.0	1.4	
46–55 years	0.9	0.8	1.2	
56–65 years	0.9	0.9	0.9	
Birth country (vs Australia)				
English-speaking	1.1	1.2	1.1	
Non-English-speaking	1.3*	1.5**	1.1	
Education (vs university)				
Diploma or certificate	1.4*	1.6**	1.2	
High school	0.9	1.0	0.9	
Less than high school	1.2	1.4	1.0	
Occupation (vs professional)				
Associate professional	1.0	1.0	0.9	
Trade	0.9	0.9	0.8	
Production	1.9***	1.9**	2.0**	
Unskilled	1.4*	1.6*	1.2	
Father's occupation (vs professional)				
Associate professional	0.9	1.0	0.8	
Trade	0.8	0.6**	1.1	*
Production	0.8	0.7*	1.0	
Unskilled	1.3	1.2	1.6*	
Mother's employment status (vs employed)				
Not employed	1.0	0.9	1.0	
Student status (vs not student)				
Enrolled full-time	0.9	0.7*	1.1	
Finished studies 1–2 years ago	0.7*	0.6	0.7	
Time in work in previous year (vs 100 per cent)				
0 per cent	109.9***	143.7***	89.0***	
1–25 per cent	36.8***	36.9***	38.9***	
26–50 per cent	22.4***	24.4***	21.7***	
51–75 per cent	15.6***	16.9***	14.9***	
76–99 per cent	10.2***	11.5***	8.4***	
Time in work since school (vs more than 50 per cent)				
Less than 50 per cent	1.4**	1.2	1.6**	

Table 2A: Multinomial Logit Results of Unemployment Regression*(continued next page)*RRR of unemployment relative to employment^(a)

	Pooled	2002	2006	Diff ^(b)
Has health condition (vs healthy)	1.3*	1.4*	1.2	
Housing tenure (vs mortgagee)				
Outright owner	1.0	0.9	1.2	
Renter	0.7*	0.8	0.6	
Family status (vs male couple with no child)				
Female	0.8**	0.9	0.6**	
Single with no child	1.3*	1.4	1.2	
Couple, male, child 0–4 years	0.8	0.9	0.7	
Couple, male, child 5–24 years	0.7	0.7	0.6	
Couple, female, child 5–24 years	0.8	0.7	0.9	
Couple, female, child 0–4 years	0.7	1.0	0.4**	
Single, child 0–14 years	1.0	0.8	1.2	
Has non-resident child	0.8	0.8	0.9	
Net wealth (vs top quintile)				
1st quintile	5.1***	4.6***	6.0***	
2nd quintile	2.8***	2.6***	3.2***	
3rd quintile	2.5***	2.5***	2.6***	
4th quintile	2.0***	2.2***	1.8*	
Income less own labour income (vs top quintile)				
1st quintile	0.7	0.8	0.7	
2nd quintile	0.8	0.8	0.8	
3rd quintile	0.9	0.9	1.0	
4th quintile	0.9	0.9	0.9	
Debt-to-income ratio (vs above 3)				
0	1.8***	1.6*	1.9**	
0–1	1.9***	1.6*	2.3***	
1–3	1.3	1.2	1.5	
Remoteness (vs capital city)				
Major city	1.0	1.1	0.9	
Rural	1.0	0.9	1.3	

Table 2A: Multinomial Logit Results of Unemployment Regression
(continued)

RRR of unemployment relative to employment^(a)

	Pooled	2002	2006	Diff ^(b)
State or Territory (vs NSW)				
Victoria	1.0	1.0	0.9	
Queensland	0.9	1.1	0.7*	
South Australia	0.7**	1.0	0.4***	*
Western Australia	0.7*	0.7	0.8	
Tasmania	0.8	1.6	0.3**	***
Northern Territory	0.3	0.2	0.4	
ACT	0.8	1.4	0.5	
Imputed (vs not imputed) ^(c)	0.7***	0.8**	0.7**	
Wald test of set of 2006 dummies within U regression equal to zero (p-value)				0.83
Memo items:				
Number of observations	17 606	8 952	8 654	
Likelihood ratio test (p-value)	0.00	0.00	0.00	
Pseudo R ²	0.53	0.54	0.54	
Predictive power ^(d)	87.6	86.8	89.0	
Wald test of full set of 2006 dummies across all of U, MA and NILF regressions (p-value)				0.13

Notes: (a) Base case is indicated in brackets for each group of categorical variables. Standard errors calculated using White's robust variance estimator. *, ** and *** indicate significance at the 10, 5 and 1 per cent levels respectively.

(b) Results from a regression of employment status on characteristic type and a set of dummies that interact characteristics with the year 2006. Null hypothesis is that the coefficient on the 2006 characteristic is equal to zero, that is, no difference in the relative probability of employment between 2006 and 2002 for that characteristic compared to the base case.

(c) Some data cells, particularly regarding household wealth, are imputed for some individuals. This variable is included as a control variable.

(d) Percentage of observations correctly predicted, where the rule is that the labour force status predicted for each individual is the category with the highest probability.

Table 2B: Multinomial Logit Results of Not in the Labour Force Regression
(continued next page)

RRR of NILF relative to employment^(a)

	Pooled	2002	2006	Diff ^(b)
2006 (vs 2002)	1.1			
Age (vs 36–45 years)				
18–25 years	0.6***	0.6*	0.6**	
26–35 years	1.0	0.9	1.2	
46–55 years	1.9***	2.0***	1.9***	
56–65 years	5.0***	5.7***	4.6***	
Birth country (vs Australia)				
English-speaking	0.9	1.0	0.9	
Non-English-speaking	1.4***	1.6***	1.2	
Education (vs university)				
Diploma or certificate	1.3**	1.8***	1.0	**
High school	1.2	1.5*	1.0	
Less than high school	1.8***	2.6***	1.2	***
Occupation (vs professional)				
Associate professional	1.2	1.1	1.3	
Trade	1.3	1.0	1.6*	
Production	1.4*	1.2	1.5	
Unskilled	1.1	1.2	1.0	
Father's occupation (vs professional)				
Associate professional	0.9	1.2	0.7*	**
Trade	0.8**	0.7**	0.9	
Production	0.9	0.8	0.9	
Unskilled	1.1	1.1	1.0	
Mother's employment status (vs employed)				
Not employed	1.0	0.9	1.0	
Student status (vs not student)				
Enrolled full-time	1.3	1.2	1.5*	
Finished studies 1–2 years ago	0.6**	0.7	0.6**	
Time in work in previous year (vs 100 per cent)				
0 per cent	584.3***	721.5***	554.6***	
1–25 per cent	37.0***	50.3***	26.3***	*
26–50 per cent	21.0***	28.7***	15.4***	*
51–75 per cent	22.3***	27.3***	18.9***	
76–99 per cent	15.3***	16.1***	14.1***	
Time in work since school (vs more than 50 per cent)				
Less than 50 per cent	1.3**	1.2	1.5**	

Table 2B: Multinomial Logit Results of Not in the Labour Force Regression
(continued next page)
 RRR of NILF relative to employment^(a)

	Pooled	2002	2006	Diff ^(b)
Has health condition (vs healthy)	2.5***	3.0***	2.2***	
Housing tenure (vs mortgagee)				
Outright owner	1.1	1.1	1.1	
Renter	0.7**	0.9	0.7*	
Family status (vs male couple with no child)				
Female	1.6***	2.0***	1.3*	*
Single with no child	0.9	0.7*	1.1	*
Couple, male, child 0–4 years	0.6*	0.4**	0.9	
Couple, male, child 5–24 years	0.7**	0.6*	0.8	
Couple, female, child 5–24 years	0.8	0.8	0.9	
Couple, female, child 0–4 years	5.6***	6.4***	5.8***	
Single, child 0–14 years	0.9	0.8	1.0	
Has non-resident child	0.6***	0.6**	0.6**	
Net wealth (vs top quintile)				
1st quintile	1.1	1.0	1.2	
2nd quintile	1.1	1.2	0.9	
3rd quintile	1.2	1.3	1.2	
4th quintile	1.1	1.3	0.9	
Income less own labour income (vs top quintile)				
1st quintile	0.5***	0.8	0.4***	**
2nd quintile	0.8	0.9	0.8	
3rd quintile	0.7**	0.8	0.7*	
4th quintile	0.7**	0.9	0.6**	
Debt-to-income ratio (vs above 3)				
0	2.2***	2.3***	2.1***	
0–1	1.6***	1.8***	1.4*	
1–3	1.1	1.2	1.1	
Remoteness (vs capital city)				
Major city	0.9	0.8	1.0	
Rural	1.0	0.8	1.3	**

Table 2B: Multinomial Logit Results of Not in the Labour Force Regression
(continued)

RRR of NILF relative to employment^(a)

	Pooled	2002	2006	Diff ^(b)
State or Territory (vs NSW)				
Victoria	1.2	1.0	1.3*	
Queensland	1.3**	1.2	1.4**	
South Australia	1.1	1.2	1.1	
Western Australia	1.2	1.2	1.3	
Tasmania	1.5*	2.1**	1.1	
Northern Territory	0.4	0.1***	1.5	**
ACT	1.0	1.3	0.8	
Imputed (vs not imputed) ^(c)	0.6***	0.7***	0.6***	
Wald test of set of 2006 dummies within NILF regression equal to zero (p-value)				0.05
Memo items:				
Number of observations	17606	8952	8654	
Likelihood ratio test (p-value)	0.00	0.00	0.00	
Pseudo R ²	0.53	0.54	0.54	
Predictive power ^(d)	87.6	86.8	89.0	
Wald test of full set of 2006 dummies across all of U, MA and NILF regressions (p-value)				0.13

Notes: (a) Base case is indicated in brackets for each group of categorical variables. Standard errors calculated using White's robust variance estimator. *, ** and *** indicate significance at the 10, 5 and 1 per cent levels respectively.

(b) Results from a regression of employment status on characteristic type and a set of dummies that interact characteristics with the year 2006. Null hypothesis is that the coefficient on the 2006 characteristic is equal to zero, that is, no difference in the relative probability of employment between 2006 and 2002 for that characteristic compared to the base case.

(c) Some data cells, particularly regarding household wealth, are imputed for some individuals. This variable is included as a control variable.

(d) Percentage of observations correctly predicted, where the rule is that the labour force status predicted for each individual is the category with the highest probability.

Table 2C: Multinomial Logit Results of Marginal Attachment Regression
(continued next page)

RRR of marginal attachment relative to employment^(a)

	Pooled	2002	2006	Diff ^(b)
2006 (vs 2002)	0.9*			
Age (vs 36–45 years)				
18–25 years	0.7**	0.6*	0.8	
26–35 years	1.1	0.8	1.4*	*
46–55 years	1.3**	1.4*	1.2	
56–65 years	1.5**	1.7**	1.3	
Birth country (vs Australia)				
English-speaking	1.1	1.1	1.0	
Non-English-speaking	1.4**	1.3	1.5**	
Education (vs university)				
Diploma or certificate	1.1	1.3	0.9	
High school	1.1	1.2	1.1	
Less than high school	1.5**	1.6**	1.4	
Occupation (vs professional)				
Associate professional	1.3*	1.3	1.3	
Trade	1.2	1.1	1.1	
Production	1.6**	1.3	1.9**	
Unskilled	1.3	1.4	1.2	
Father's occupation (vs professional)				
Associate professional	1.0	1.2	0.8	
Trade	0.8	0.8	0.9	
Production	0.8**	0.6**	0.9	
Unskilled	1.2	1.5*	0.9	
Mother not employed (vs employed)				
Not employed	0.9	0.8*	1.0	
Student status (vs not student)				
Enrolled full-time	1.4**	1.5*	1.4	
Finished studies 1–2 years ago	0.9	0.8	1.0	
Time in work in previous year (vs 100 per cent)				
0 per cent	353.0***	466.3***	315.5***	
1–25 per cent	33.9***	43.0***	29.0***	
26–50 per cent	26.7***	36.2***	20.9***	
51–75 per cent	17.9***	25.5***	13.4***	*
76–99 per cent	8.8***	8.3***	9.2***	
Time in work since school (vs more than 50 per cent)				
Less than 50 per cent	1.1	1.1	1.1	

Table 2C: Multinomial Logit Results of Marginal Attachment Regression
(continued next page)

RRR of marginal attachment relative to employment^(a)

	Pooled	2002	2006	Diff ^(b)
Has health condition (vs healthy)	1.9***	2.2***	1.6***	
Housing tenure (vs mortgagee)				
Outright owner	1.3	1.4*	1.0	
Renter	0.9	1.0	0.8	
Family status (vs male in couple with no child)				
Female	1.0	1.0	1.1	
Single with no child	1.2	1.0	1.5**	
Couple, male, child 0–4 years	0.8	0.8	0.9	
Couple, male, child 5–24 years	0.7	0.7	0.9	
Couple, female, child 5–24 years	1.3	1.5	1.1	
Couple, female, child 0–4 years	4.1***	6.2***	2.7***	**
Single, child 0–14 years	2.0***	2.0**	2.0**	
Has non-resident child	0.7*	0.7	0.8	
Net wealth (vs top quintile)				
1st quintile	1.8***	1.5	2.2**	
2nd quintile	1.4*	1.1	1.7*	
3rd quintile	1.4**	1.3	1.5*	
4th quintile	1.2	1.2	1.2	
Income less own labour income (vs top quintile)				
1st quintile	0.5***	0.8	0.4***	*
2nd quintile	0.8	1.1	0.6**	**
3rd quintile	0.7**	0.7	0.7*	
4th quintile	0.8*	1.0	0.6**	
Debt-to-income ratio (vs above 3)				
0	1.6***	2.1***	1.4	
0–1	1.6***	2.2***	1.3	*
1–3	1.4**	2.1***	1.0	**
Remoteness (vs capital city)				
Major city	1.0	1.1	0.9	
Rural	1.1	1.2	1.1	

Table 2C: Multinomial Logit Results of Marginal Attachment Regression
(continued)

RRR of marginal attachment relative to employment^(a)

	Pooled	2002	2006	Diff ^(b)
State or Territory (vs NSW)				
Victoria	1.1	1.0	1.2	
Queensland	1.1	1.1	1.1	
South Australia	1.0	1.0	1.1	
Western Australia	0.8	1.0	0.6*	
Tasmania	1.6**	2.1**	1.4	
Northern Territory	0.5	0.2**	0.7	
ACT	0.6	0.7	0.6	
Imputed (vs not imputed) ^(c)	0.7***	0.7**	0.7***	
Wald test of set of 2006 dummies within MA regression equal to zero (p-value)				0.11
Memo items:				
Number of observations	17 606	8 952	8 654	
Likelihood ratio test (p-value)	0.00	0.00	0.00	
Pseudo R ²	0.53	0.54	0.54	
Predictive power ^(d)	87.6	86.8	89.0	
Wald test of full set of 2006 dummies across all of U, MA and NILF regressions (p-value)				0.13

Notes: (a) Base case is indicated in brackets for each group of categorical variables. Standard errors calculated using White's robust variance estimator. *, ** and *** indicate significance at the 10, 5 and 1 per cent levels respectively.

(b) Results from a regression of employment status on characteristic type and a set of dummies that interact characteristics with the year 2006. Null hypothesis is that the coefficient on the 2006 characteristic is equal to zero, that is, no difference in the relative probability of employment between 2006 and 2002 for that characteristic compared to the base case.

(c) Some data cells, particularly regarding household wealth, are imputed for some individuals. This variable is included as a control variable.

(d) Percentage of observations correctly predicted, where the rule is that the labour force status predicted for each individual is the category with the highest probability.

5.3 Comparing 2002 and 2006

A key point of this paper is to see how the association between characteristics and labour market status may have changed after a period of strong employment growth. Unlike for the binomial regression, we find that there has been a statistically significant change between 2002 and 2006; a Wald test of the significance of the full set of 2006 interactive dummies for the not-in-the-labour-force regression has a p-value of 5 per cent (while the p-value of the test for marginal attachment regression is 11 per cent). Further, for both the marginal attachment and not-in-the-labour-force regressions, the 2006 coefficient estimates for several groups of characteristics are statistically different to the 2002 estimates (see Appendix Table B2).

These results have two key implications. First, much of the increase in the rate of employment over this period was generated by higher participation, suggesting a significant role for changes in labour supply. Second, the pool of those who are unemployed does not appear to have become more concentrated in characteristics associated with low employment rates.

5.3.1 *Marginal attachment and not in the labour force*

The joint test of the interactive dummies indicates some change in the characteristics of the not-in-the-labour-force and marginally attached groups. More specifically, we find that for both of these groups:

- the RRR decreased for older people, reflecting an increase in participation by these cohorts between 2002 and 2006;
- the RRR decreased for mothers in a couple with young children;
- the RRR decreased for those who had not been fully employed in the previous year (that is, less than 100 per cent of their available time working); and
- the RRRs decreased for low income and poor health, as well as unskilled occupations and less-than-high-school education, consistent with an increase in

demand for, and supply of, such workers during an extended upswing in economic activity.

It is worth noting that these first two points are consistent with the documented delay in retirement and increased use of childcare (as indicated by ABS data). It is likely that policy and attitudinal changes have influenced these decisions, as a four-year period is probably too short for cohort effects to be important.

Based on HILDA data, the marginal attachment rate fell much more than the not-in-the-labour-force rate over the period 2002 to 2006. This has implications for measuring labour supply. Currently, the marginally attached are contained within the not-in-the-labour-force group in the standard LFS measure of labour force participation. However, as much of the extra employment has been due to a fall in marginal attachment, a broader (and potentially more relevant) measure of participation may include the marginally attached in the labour force. This is also consistent with the finding that the marginally attached have many characteristics in common with the unemployed in terms of their prospects of employment. Using LFS data for those aged 15–69 years, this alternative definition of the labour force would suggest a slower rate of growth in labour supply from 2002 to 2006 (from 78.3 per cent to 79.3 per cent) than the standard definition (from 72.2 per cent to 74.2 per cent).¹²

5.3.2 *Unemployment*

The relationship between personal characteristics and unemployment appears to have changed by less between 2002 and 2006 than for the other two not-employed categories; the Wald test reports that the set of interactive dummies are not jointly significantly different from 1 and very few interactive dummies are individually significant. This suggests that on average, the characteristics of the unemployed pool have not changed substantially between 2002 and 2006. As is the case for the other labour force states, the point estimates suggest that characteristics associated with the lowest employment rates in 2002 (such as being from a non-English-speaking country, having less than university-level education, being unskilled,

¹² Data on the marginally attached for 2002 and 2006 are only available for the age group 15–69 years and not for the standard labour force sample that covers those aged 15 years and above. See ABS 2007.

having little recent work experience, or being in poor health) were less likely to be associated with unemployment in 2006.

5.4 Comment

Our results indicate that as employment expanded between 2002 and 2006 lower-skilled workers and groups which had lower participation rates were drawn into employment at slightly higher rates than groups with high employment rates in 2002. In general, this is consistent with Okun's theory that during a period of expansion, workers in the labour market trade up and vacancies are filled by less-skilled workers. It is also consistent with the notion that structural changes have occurred in the labour market to support participation by groups which typically have low participation rates, such as mothers with young children and older workers.

Further, there was a notable rise in the level of experience of the not-employed pool; from 2002 and 2006, the share of people with very low previous work experience fell, while the share of people who had worked for over 75 per cent of the previous year rose (Figure 3). This reflects the fact that there is considerable churn in the labour market as individuals move between jobs and in and out of employment.¹³ As the employment rate rose over this period, the duration of employment and the probability of finding employment also increased, raising the average level of recent work experience of the whole population. This suggests that at high levels of employment, the average level of experience of the population is higher, somewhat mitigating against a shortage of suitable labour.

¹³ Monthly LFS data from 2000–2005 indicate that around 4 per cent of employees are not employed in the next month, while just over 20 per cent of the unemployed and 10 per cent of NILF are employed in the next month. In the annual HILDA sample, around 8 per cent of the employed are not employed when interviewed the following year, while around 50 per cent of the unemployed and 20 per cent of those not in the labour force were employed when interviewed in the following year (for the period 2001/02 to 2004/05) (Carroll and Pöhl 2007).

Figure 3: Share of Previous Year Spent in Work
Share of the pool outside employment



Note: Share with 0% work experience in previous year was 75.5 per cent in 2002 and 75.2 per cent in 2006 (not shown)

Source: HILDA Survey, Release 6.0

6. Conclusion

Data from the HILDA Survey confirm that employment tends to broaden during an expansionary phase. Using estimates of an econometric model describing the probability of being employed versus not employed, we find that from 2002 to 2006 there was some broadening of employment across individuals who were low-skilled or had other characteristics typically associated with low participation in the labour market. While this change is not statistically significant, there is clear evidence of a broadening of employment when we conduct the analysis after separating those who are not employed into three different groups, namely: those who are marginally attached, those who are not in the labour force and those who are unemployed. There is evidence of a statistically significant change in the relationships between personal characteristics and the probability of being marginally attached; the same is true for those not in the labour force. In particular, the probability of being in one of these two states (versus being employed) was significantly lower in 2006 than in 2002 for individuals having characteristics that

are typically associated with a low level of labour supply (such as being over 55 years of age or a partnered woman with young children). This result indicates an increase in the relative employment rates of these types of people over this period of strong employment growth. In contrast, a change was not noted in the characteristics of people in unemployment, which were broadly similar in both years. One implication of these results is that it is worth looking beyond the unemployment rate when considering the capacity of employment to expand during a period of strong labour demand.

Appendix A: Variable Definitions

Table A1: Information Regarding the Variables Used

Dependent variable

Labour force status Definitions used are the same as for the *Labour Force Survey*, ABS Cat No 6202.0. Measured at the time of the survey.

Explanatory variables

For each category listed below there are several potential characteristics. In the regressions we include a dummy variable for each possibility, which will take the value of 1 if the individual exhibits that characteristic and 0 otherwise. For a list of variables see Tables B1 and B2.

Household income (excluding individual labour income) quintile Annual gross household income excluding the individual's labour income but including the partner's (and other family members') labour income as in Belkar *et al* (2007). It is also used as the denominator in the debt-to-income ratio.

Occupation Based on one-digit ASCO classifications. Associate professionals includes associate professionals, intermediate services workers and clerical workers. Unskilled includes elementary clerical, unskilled clerical and unskilled labour. The occupation of not-employed individuals is that of their most recent job.

Father's occupation Uses the same classification as for the individual's occupation. Refers to the occupation of the father when the individual was 14 years of age.

Family type based on age of child Classifies all individuals into a family type first based on whether they have a partner or are single and then by the age of their own youngest resident child (in years). A separate variable is also included to capture non-resident children under the age of 18 years.

City variables Capital cities; major cities; and rural. Major cities includes all major cities and inner regional areas based on ARIA scores from the 2001 Census. Rural is outside of capital or major cities.

Net worth Household assets less household debt.

Migrant status An individual is either born in Australia; born in a non-English-speaking country; or born in an English-speaking country.

Mother's employment status Mother's employment status (employed or not employed) when the individual was 14 years of age.

Student status Three categories are included: full-time student; finished studies within the previous two years; and other. This last category is referred to in Tables 1 and 2A–C as 'not-student' but includes part-time students.

Time in work in previous year Measures the proportion of the previous financial year that the individual spent in employment. This measure does not overlap in time with current employment status.

Health condition 'Has health condition' are those who have a long-term health condition, disability or impairment.

Appendix B: Results Tables

Table B1: Wald Tests of Groups of Coefficients in Binomial Logit

Null hypothesis: 2006 coefficients equal to 2002 coefficients; p-values

Age	0.37	Housing tenure	0.53
Education	0.13	Parental status	0.35
Occupation	0.47	Net wealth	0.65
Parent's employment	0.01	Alternative income	0.22
Enrolled	0.37	Debt-to-income ratio	0.83
Work history	0.49	Location	0.07

Table B2: Wald Tests of Groups of Coefficients in Multinomial Logit

Null hypothesis: 2006 coefficients equal to 2002 coefficients; p-values

	Unemployment	Marginal attachment	NILF
Age	0.63	0.16	0.66
Education	0.64	0.71	0.05
Own occupation	0.86	0.66	0.43
Parent's employment	0.21	0.03	0.03
Enrolled	0.23	0.84	0.77
Work history	0.68	0.52	0.36
Housing tenure	0.41	0.53	0.59
Parental status	0.45	0.16	0.10
Net wealth	0.82	0.71	0.46
Alternative income	0.91	0.14	0.14
Debt-to-income ratio	0.14	0.14	0.76
Location	0.06	0.73	0.04

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