



THE UNIVERSITY OF  
MELBOURNE

## Melbourne Institute Working Paper Series

### Working Paper No. 25/09

Does Part-Time Employment Help or Hinder  
Lone Mothers' Movements into Full-Time Employment?

*Yin King Fok, Sung-Hee Jeon and Roger Wilkins*



MELBOURNE INSTITUTE®  
of Applied Economic and Social Research

# **Does Part-Time Employment Help or Hinder Lone Mothers' Movements into Full-Time Employment?\***

**Yin King Fok, Sung-Hee Jeon and Roger Wilkins**  
**Melbourne Institute of Applied Economic and Social Research,**  
**The University of Melbourne**

**Melbourne Institute Working Paper No. 25/09**

**ISSN 1328-4991 (Print)**

**ISSN 1447-5863 (Online)**

**ISBN 978-0-7340-3320-8**

**December 2009**

\* This paper derives from research commissioned by the Australian government Department of Education, Employment and Workplace Relations (DEEWR). 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 Family, Housing, Community Services and Indigenous Affairs (FaHCSIA) and is managed by the Melbourne Institute of Applied Economic and Social Research (MIAESR). Additional funding to support this research was provided by the Faculty of Economics and Commerce, University of Melbourne. The findings and views reported in this paper are those of the authors and should not be attributed to DEEWR, FaHCSIA or the MIAESR.

**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](mailto:melb-inst@unimelb.edu.au)**

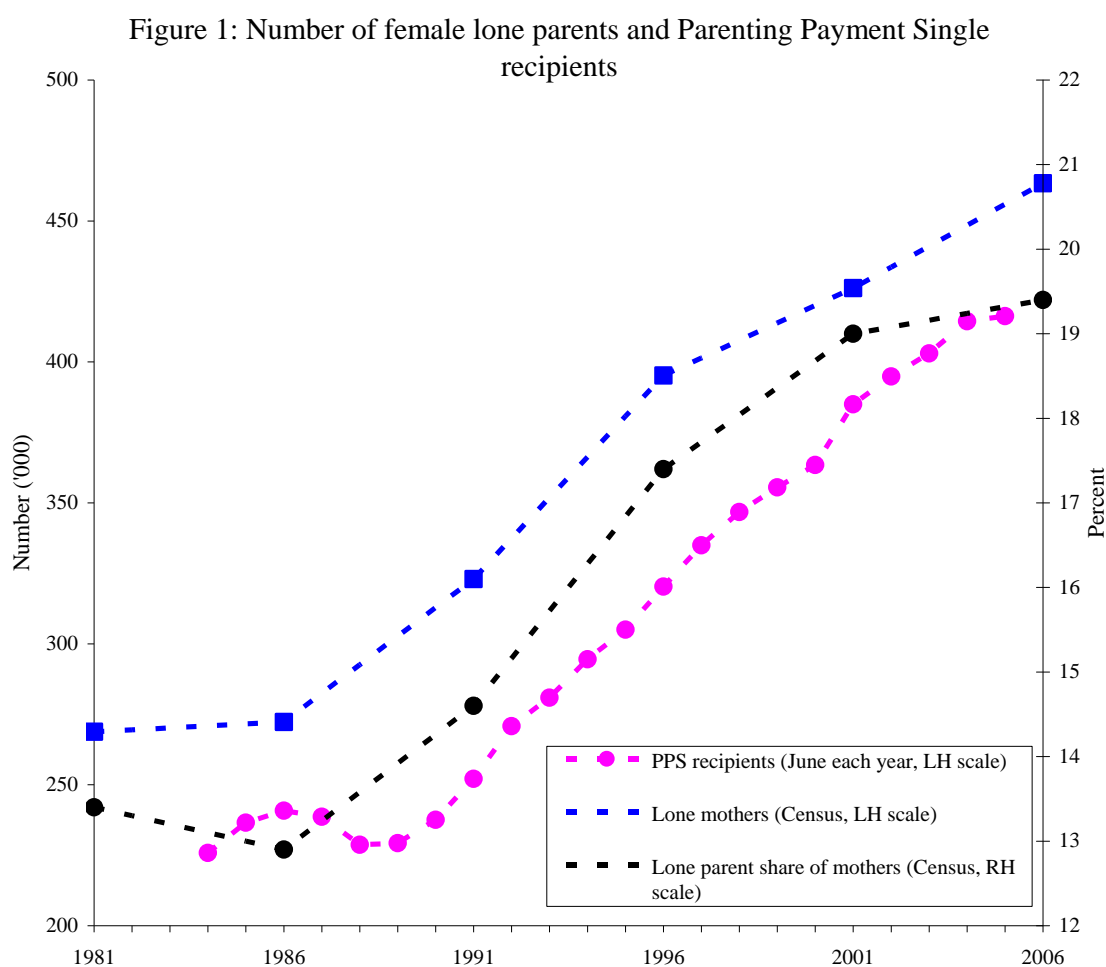
***WWW Address* <http://www.melbourneinstitute.com>**

### **Abstract**

A significant demographic trend in recent decades in Australia has been the growth in lone parent families as a proportion of all families, associated with which has been growth in welfare dependency. This has led to considerable policy focus on increasing lone parent participation in employment. A key issue that has arisen for the Government in pursuing this policy goal is whether, in the context of a welfare system that accommodates the combining of part-time employment with welfare receipt, part-time employment helps or hinders a progression to full-time employment, and whether and how this depends on characteristics such as the number and ages of dependent children. In this study, we investigate this issue using Australian panel data on female lone parents over the period 2001 to 2007. We estimate dynamic random effects multinomial logit models of three labour force states – not employed, employed part-time, and employed full-time – allowing investigation of whether part-time work represents a stepping stone to full-time employment. Evidence in support of the stepping stone hypothesis is found. Part-time employment increases the probability of full-time employment in the next year by approximately six percentage points. No (statistically significant) evidence is found that this stepping stone function varies by number of children or age of the youngest child.

## 1. Introduction

A significant demographic trend in recent decades, in Australia and elsewhere, has been the growth in lone parent families as a proportion of all families. In 1981, 13 per cent of mothers with dependent children were lone parents; by 2006, this had risen to 20 per cent (Figure 1). Associated with this increase has been growth in welfare dependency of mothers of dependent children, women who may otherwise have depended on a combination of partner income and income from their own part-time employment.



Sources: Census sample file and FaHCSIA (2008) 'Income support customers: a statistical overview 2005,' Statistical Paper No. 4. Note: Statistics relate only to mothers with dependent children.

These concomitant trends have led to considerable policy interest in increasing lone parent participation in employment, both from the perspective of increasing the financial wellbeing of lone parents and their children, and from the broader perspective of restraining the extent of community dependence on welfare. The growing emphasis on employment of lone parents

– especially part-time employment – also reflects a shift in community norms that has occurred over time, whereby even in couple-parent households, part-time employment of the primary caregiver parent has become commonplace, if not expected, once children reach school age. Correspondingly, for some years now, welfare policy with respect to lone parents has increasingly facilitated and indeed encouraged the combining of welfare receipt with part-time employment via relatively ‘generous’ allowances for earnings and low rates of withdrawal of benefits as earnings increase. Moreover, since July 2006, some lone parents with school-age children have been *required* to seek part-time employment as a condition of eligibility for benefits.

While a policy stance promoting part-time employment combined with benefit receipt would seem to be unambiguously in the short-term interests of lone parent families, a potential concern is that policy that accommodates the long-term combining of part-time work with welfare receipt may promote long-term welfare reliance. A key question is thus whether, in the context of such a welfare system, part-time employment helps or hinders a progression to full-time employment. On one hand, part-time work may be a valuable means for mothers of keeping in touch with the labour market until circumstances allow fuller participation, which in practical terms is likely to mean once the children are all beyond a certain age. On the other hand, it is possible that allowing people to comfortably combine part-time work and benefits keeps them on income support payments longer than they otherwise would be, arguably to their longer-term detriment.<sup>1</sup> That is, it may in fact be in the long-run interests of all concerned to have a policy framework encouraging lone mothers to work full-time or not at all, despite the higher care requirements of young children and the short-term lower incomes this may imply for lone parents with young children.

This policy context provides the primary motivation for this study, in which we investigate the determinants of labour force status of single mothers, with a particular focus on the role of part-time employment in promoting or inhibiting movements into full-time employment of female lone parents. Note that while the policy environment (and indeed other environmental factors) will in general impact on the role of part-time employment, our study is not of the effects of welfare policies themselves. Rather, our focus is on how part-time employment

---

<sup>1</sup> Welfare reforms introduced in July 2006 have changed the policy landscape somewhat, with the requirement to seek part-time employment for lone parent benefit recipients accompanied by a lower level of benefit and a less generous income test for some recipients, which has the effect of encouraging either lower employment participation or much higher participation at a level that precludes receipt of benefits. We attempt to take into account this change in policy environment in our econometric models.

affects transitions into full-time employment, given the particular set of institutional arrangements that pertain in Australia.

Our primary research question is straightforward, but it is not entirely straightforward to answer, at least with currently available data. Most importantly, selection of single mothers into part-time and full-time employment is far from random, making it difficult to separate effects of part-time employment itself from effects of unobserved characteristics associated with participation in part-time employment. Ideally, we would be able to identify a source of exogenous selection into part-time employment. For example, random assignment of lone mothers to part-time employment and non-employment would allow us to compare the subsequent rates of movement into full-time employment of the two groups, the difference providing us with a valid estimate of the causal impact of part-time employment.

Such random assignment to ‘treatment’ is not available, but the availability of household panel data provides an opportunity to examine the determinants of labour force outcomes of lone parents employing techniques that attempt to address the non-randomness of assignment to initial and subsequent labour force status. Specifically, we use Australian household panel data for the period 2001 to 2007 to estimate dynamic panel multinomial logit models of three labour force states: not employed, employed part-time, and employed full-time. Investigation of whether part-time work represents a stepping stone to full-time employment is undertaken by inclusion of variables for one-period lagged labour force status outcomes. Confounding effects of unobserved heterogeneity are addressed by adopting of a random effects specification of the logit model and by accounting for initial conditions using the Wooldridge (2005) method.

As part of our analysis, we examine how the role of part-time employment depends on the number and ages of dependent children, with particular interest in whether a stepping stone function becomes more apparent as the children age. However, the relatively small sample of lone parents in the data set used limits the ability to estimate with precision such interaction effects.

Our analysis also has a more general purpose, which is to shed light on the determinants of lone mother labour force status more generally, employing a dynamic framework that accounts for confounding effects of state dependence and unobserved heterogeneity. We thus consider the effects of age, educational attainment, work experience, place of birth, health, non-labour income, housing situation, location of residence and partnering. As is perhaps clear from our preceding discussion, distinct investigation of labour market participation of

lone mothers is easily defended. Findings on the determinants on employment participation for other labour market participants – even partnered mothers – are unlikely to translate very well to lone parent mothers. The labour market choices and constraints facing lone parent women are fundamentally different from those faced by other labour market participants. In particular, lone parent women typically face acute child care constraints, whereas partnered mothers make labour supply decisions as part of a household labour supply decision that is made in the presence of another potential carer and labour market participant. Access to Parenting Payment Single, the welfare benefit for lone parents, also has implications for labour supply behaviour and – as noted – growth in reliance on this payment is a key motivation for understanding the employment outcomes of single mothers. It is therefore valuable to investigate the determinants of lone parent employment participation as distinct from other mothers and other labour market participants more generally.

Our estimates suggest that part-time employment does to some extent serve as a stepping stone to full-time employment. The point estimates imply part-time employment in the previous wave increases the probability of full-time employment in the current wave by between 4 and 5 percentage points. No statistically significant evidence of variation stepping-stone function of part-time employment by number of children or age of youngest child is found, although we caution that this may reflect a relative small sample size rather than true absence of differences in effects. In particular, we obtain some large point estimates of differences by age of youngest child, suggesting we should not be surprised if statistically significant differences were found in a larger sample.

The plan of the paper is as follows. In Section 2, we summarise the relevant international research on single mother labour market outcomes. Section 3 describes our approach and data. Section 4 presents results of descriptive analysis, including describing the extent and nature of single mother labour force status transitions. We provide details of our econometric approach to analysis of the determinants of labour force status in Section 6 and present the results of the analysis in Section 6. Section 7 concludes.

## **2. Previous research on labour market participation of lone mothers**

No previous Australian research has expressly examined the role of part-time work for single mothers as a stepping stone to full-time work, and indeed, research on this topic is very limited internationally. Several UK studies, including Iacovou and Berthoud (2001), Kasparova et al (2003), Barnes et al (2005) and Hales et al (2007) (summarised in Bell et al

(2007)), have examined whether “mini jobs” – jobs of 4-15 hours per week – act as a stepping stone to longer hours of work. The evidence presented by these studies is largely descriptive analysis of pathways and the characteristics associated with transition paths, and provides no clear indications of a stepping-stone role of mini-jobs. The studies have found, however, that employment in mini jobs is less stable for lone mothers than partnered mothers, likely to be largely attributable to interactions between the tax and benefit system for lone parents (especially the income test of the lone parent benefit and the hours requirement (of 16 hours per week) for eligibility for the Working Families’ Tax Credit (WFTC).

Studies that focus on the role of part-time employment for (single and partnered) females more generally include Blank (1998) and Buddelmeyer et al (2005). Blank (1998), examining the period 1976 to 1989, estimates that about 20 per cent of women in the US use part-time jobs as transitory jobs before moving into full-time work. Buddelmeyer et al (2005), using the European Community Household Panel for the period 1994 to 1999, suggest that the probability of remaining in part-time work is considerably higher among women in the EU than among women in the US. They suggest that Europeans more frequently view part-time jobs as (relatively) permanent jobs.

Recent international research on employment of lone mothers has primarily been concerned with the evaluation of the effects of in-work benefits on single mothers’ labour supply. Meyer and Rosenbaum (2001), using the Current Population Survey (CPS), suggest a large share of the increase in work by single mothers during 1984-1996 in the US can be attributed to the Earned Income Tax Credit (EITC). They find most of the EITC policies increased hours worked. Eissa et al (2007) examine the effect of a series of US tax reforms in 1986, 1990, 1993 and 2001 on the labour supply and wellbeing of single mothers, also using data from the CPS. They find the tax reforms created substantial welfare gains for single mothers and that almost all of the gain was generated along the participation margin – that is, increasing labour force participation of single mothers rather than increasing hours worked by single mothers already working.

UK studies evaluating the Working Families’ Tax Credit (WFTC) have obtained similar results to the US studies of the EITC. Using the British Household Panel Survey (BHPS), Francesconi and van der Klaauw (2007) find that the reform of the WFTC in 1999 substantially increased the employment rate of single mothers, via lowering the rate of exit from employment as well as increasing the rate of entry into employment. Their findings also suggest that the generous child care credit component of the reform played a key role in



increasing single mothers' employment. Blundell et al (2005), also using the BHPS, find the reform in 1999 led to a significant increase in single mothers' hours of work compared to two earlier tax and benefit reforms in the 1990s. They further find that the increase in hours was primarily driven by women moving into higher-hours jobs rather than increasing hours worked in existing jobs. Bingley and Walker (1997) looked at the effects of Family Credit (FC), the predecessor to WFTC, conducting simulation analyses showing that increases in FC would increase participation in part-time employment.

Gonzalez (2004) examines cross country variation in single mothers' labour market participation using the Luxembourg Income Study. Differences in demographic characteristics and variation in the expected in-work income to out-of-work income ratio (essentially equivalent to the welfare replacement rate in many countries) are found to explain much of the variation in single mother employment rates across 15 western countries. Higher in-work benefits in particular are found to encourage employment of single mothers.

An issue increasingly receiving attention in economics research that has high relevance to single mothers is child care provision. Studies by Han and Waldfogel (2001), Connelly and Kimmel (2003) and Tekin (2007) in the US, Jenkins and Symons (2001) in the UK and Andren (2003) in Sweden all find strong impacts of child care prices on lone parent labour supply. Australian research has likewise in recent years examined the relationship between child care cost and labour supply of lone mothers. This includes studies by Doiron and Kalb (2002, 2005a, 2005b), Kalb and Lee (2007, 2008) and Rammohan and Whelan (2005). Among the findings of these studies is that lone parent labour supply is considerably more responsive to child care costs than is partnered mothers' labour supply.

International studies have also examined various other influences on lone parent employment. Wolfe and Hill (1995) suggest, based on data from SIPP, that the health of single mothers and their children is an important determinant of their decision to work. Bingley et al (1995) consider the effects on labour supply of lone mothers of a UK reform to child support arrangements introduced in 1990. Using the Families and Children Study (FACS) and the BHPS, Paull (2007) examines the relationships between partnership transitions and changes in both labour force participation and weekly hours of work across different type of mothers, as well as drawing comparisons with childless women. The study suggests that partnership transitions are unlikely to be an important factor in explaining the substantial differences in work behaviour between mothers. However, the strong association between separations and unusually high rates of work exit is observed only for mothers, suggesting that separations are a period of disruption

specific to the movement into lone parenthood. The findings also suggest that single mothers who find a new partner are more likely to be working prior to becoming partnered than are mothers who remain single.

In Australia, there has in recent years also been research into the nature and determinants of labour market activity of sole parents more generally. Barrett and Cobb-Clark (2001) evaluate a randomised trial of a program targeting parenting payment recipients, finding that attendance at an interview to discuss job market plans leads to increased plans to undertake education and participate in employment. They also find that the effects of the interview do not depend on whether attendance is voluntary or compulsory. Barrett (2002) uses Centrelink administrative data on sole parents to model durations on the sole parent pension (later Parenting Payment Single). Exit rates are found to be lower, and therefore spell durations higher, for females, relatively younger and older sole parents, those with little attachment to the labour market and those living in regions where the effective public housing subsidy was greatest.

Gregory et al (2003) likewise draw on administrative data on sole parents, considering the impact of the July 2000 tax and welfare reforms on take-up of welfare and employment. They conclude that the reduction in taper rates actually increased the number of sole parents on welfare, because more sole parents were eligible for partial payment at a given level of earnings. Cai et al (2005) also evaluate the effects of the July 2000 tax and welfare reforms, but use ABS income survey data and employ both quasi-experimental evaluation and microsimulation modelling techniques. They find significant positive effects on labour supply, a finding not exactly contradicting but nonetheless seemingly somewhat at odds with Gregory et al (2003), who focus on welfare receipt. In a similar vein, Doiron (2004) draws on the ABS income surveys in 1986 and 1990 to evaluate the effects of welfare reform in 1987 on sole parent labour supply using quasi-experimental evaluation methods. The reforms narrowed the definition of a dependent child for the purposes of sole parent pension eligibility, increased the income test 'free area', introduced a \$1,000 earnings credit (much like the current Working Credit program) and abolished the separate income test for rent assistance. She finds large positive effects on labour force participation, but negative effects on the number of hours worked by those already employed.

Gray et al (2002) use the 1996 census to investigate the factors underlying the lower rates of employment of sole parent females compared with partnered mothers. They find that the same characteristics that are associated with lower employment rates of partnered mothers are

associated with lower employment rates for single mothers, but the effects associated with these characteristics are larger for sole parent females, and more sole parents have these characteristics than do partnered mothers. Gray et al (2003) take a longer view than the other studies, examining labour force status of both single and coupled mothers over the period 1983 to 2002. They show that part-time employment grew substantially for single mothers, but the rate of full-time employment remained unchanged. By contrast, there was a significant increase in both part-time and full-time employment for partnered mothers. Baxter (2005a, 2005b) uses the data from the Negotiating the Life Course Surveys to examine mothers' employment transitions following the birth of first child, actually finding *higher* employment rates for sole parents one year after childbirth.

### **3. Data and sample selection rules**

The study draws on Waves 1 to 7 of the Households, Income and Labour Dynamics in Australia (HILDA) Survey, a nationally representative household panel study that commenced in 2001. In Wave 1, 13,969 individuals aged 15 years and over were interviewed, of whom 8,409 had been interviewed in all seven waves—although data had been obtained in one or more waves for a total of 19,771 individuals aged 15 years and over.

The analysis is of female sole parents' labour market participation, particularly focusing on transitions between non-employment, part-time employment and full-time employment. While non-participation and unemployment are typically viewed as distinct labour force states, the value of the distinction in the current context is likely to be limited and, more pertinently, very few lone parents in our sample are ever unemployed. That is, the sample size is not sufficient to support this distinction. A single mother is defined to be a woman living with one or more of her own dependent children and not living with a partner. A child living with his or her mother is defined to dependent if under 16 years of age or if aged 16-24 years and in full-time study (and not employed full-time or living with a partner or a child of his or her own). These definitions are consistent with the ABS approach to defining sole parent families.

The HILDA Survey data is derived from an annual survey, comprising a personal interview as well as a self-completion questionnaire administered to every sample member over 15 years of age. While detailed labour market-related information is collected for the financial year preceding the interview and for the period since the respondent was last interviewed, part-time/full-time employment status is only ascertained as at the time of interview.

Correspondingly, our study is of transitions between non-employment, part-time employment and full-time employment from one wave to the next. This implies that some transitions will not be captured by our analysis – specifically, whenever an individual makes more than one transition between one wave and the next. For example, a movement from non-employment to part-time employment and then from part-time employment to full-time employment before the next interview will be identified as a single transition from non-employment to full-time employment.

Some sense of the extent to which transitions are missed by examining labour force status only at the time of interview can be garnered from the ‘work calendar’. In each wave, the work calendar provides details on labour force status in each third of the month for at least the 12 months leading up to interview. This provides a relatively comprehensive picture of labour force status transitions over the period spanned by the HILDA data, providing information on the extent to which transitions are captured when using data on labour force status at the time of the survey interview. Note, however, that the work calendar does not distinguish part-time employment from full-time employment. Examining this data, we find that of the 20.6 per cent who on average making at least one transition between employment and non-employment within a year, 41 per cent make at least two transitions.<sup>2</sup> Of those making at least two transitions, the mean number of transitions is 2.4. It is thus clear that a significant number of transitions are missed by the restriction to once-annually measured information.

The sample for the econometric analysis comprises the 877 women who were sole parents with dependent children in at least one of the seven waves and responded in at least two consecutive waves. Sample members are followed from when the wave in which they first respond until they miss a wave. For 556 of the sample members, all seven waves of data are available, while for the remaining 321 sample members data are available for only a subset (between two and six) of the seven waves. Clearly, this inclusive approach results in observations in which the respondent is not a sole parent, most commonly because she is living with a partner. We address this issue by including a partner status variable in the estimating equations, and interacting this with the variables for lagged labour force status and the number and ages of dependent children. That is, we retain in the estimation sample sole parents who were at some staged partnered and include partner status as an explanatory factor

---

<sup>2</sup> Some calendar data is missing because of recall problems for some respondents. In a period (third of a month) missing data, we assume labour force status is unchanged from the period in which labour force status was last reported. We exclude individuals missing data for more than nine periods, which translates to more than one-quarter of the 36 periods required for a complete 12-month history.

for labour force status. This approach is consistent with that taken by other studies (e.g., Francesconi and van der Klaauw 2007).<sup>3</sup>

To provide an indication of the potential nature and magnitude of sole parent partnering, the upper panel of Table 1 considers changes in partner status for those who were single mothers in Wave 1 and responded in all seven waves. It shows that subsequent partnering over the seven year period is a significant phenomenon for this group, with over one-quarter partnered in Wave 7. The lower panel of Table 1 shows partner status in each wave for women who meet the sample inclusion criterion for the econometric models of being observed to be single mothers in any of the seven waves of the survey (although for the purposes of this table, we restrict to those who responded in all seven waves). For this group, 36 per cent were partnered in Wave 1, and the fraction partnered never falls below one-quarter over the seven waves. It is thus clear that accounting for partnering is important; but equally, it is important not to exclude those who partner, or those periods in which they are partnered, because it has the potential to cause sample selection biases.

Table 1: Marital status of mothers by wave (balanced panel) (%)

	Legally Married	De facto	Single
A. Single mothers in Wave 1			
Wave 1	0.00	0.0	100.0
Wave 2	1.9	6.4	91.6
Wave 3	3.2	10.9	85.9
Wave 4	6.1	9.7	84.2
Wave 5	9.3	9.7	81.0
Wave 6	11.3	14.2	74.6
Wave 7	11.6	15.8	72.7
B. Mothers who had ever been single			
Wave 1	27.2	9.0	63.9
Wave 2	21.4	10.1	68.5
Wave 3	18.9	11.0	70.1
Wave 4	16.9	10.1	73.0
Wave 5	16.2	9.7	74.1
Wave 6	15.7	12.2	72.1
Wave 7	12.1	13.7	74.3

Note: Sample A comprises a balanced panel of 311 women who were single mothers in Wave 1. Sample B comprises a balanced panel of 556 women who were observed to be single mothers in any of the seven waves.

<sup>3</sup> Alternative approaches would be to exclude observations where a person is not a sole parent in that particular wave or exclude from the sample altogether persons who are not sole parents for the entire seven waves. Neither approach is preferable to the approach we take, because each introduces selection (or censoring) into the sample on a characteristic (essentially, propensity to be partnered) that is unlikely to be random with respect to labour force status.

#### 4. Descriptive statistics

Table 2 provides contextual information, describing the demographic characteristics of single mothers with dependent children via comparisons with their partnered counterparts. The table pools all seven waves of data, so that each woman contributes up to seven observations; those who change partner status will contribute observations to both groups of women. There are clearly differences in the characteristics of single mothers compared with partnered mothers, although differences are perhaps not as large as might be expected. On average, single mothers have fewer dependent children than partnered mothers – 1.7 compared with 2. The youngest child is on average over a year older for single mothers than for partnered mothers, which in part reflects the fact that the majority of single mothers were in fact partnered when their last child was born. The proportion of single mothers who had their first child before age 20 is 22.6 per cent, compared with 8.5 per cent for partnered mothers.

**Table 2: Demographic attributes of single mothers – All waves pooled**

	Single mothers	Partnered mothers
Mean no. of dependent children	1.7#	2.0
Mean age of youngest child	8.6#	7.5
<i>Age at birth of first child (%)</i>		
<20	22.6#	8.5
20-29	59.3#	63.0
30+	18.1#	28.4
Married when last child born (%)	63.5#	88.9
<i>Current age (%)</i>		
15-24	9.3#	3.6
25-34	26.5	26.8
35-44	36.1#	47.8
45+	28.1#	21.8
<i>Educational attainment (%)</i>		
Year 10 and below	29.4#	21.7
Year 11-12	21.8#	27.1
Certificate	31.6#	25.0
Degree+	17.2#	26.2
<i>Location of residence (%)</i>		
Major city	59.5	61.2
Inner regional	26.4	25.4
Outer regional	14.1	13.4
<i>Place of birth (%)</i>		
Australia	69.9#	74.4
ESB immigrant	8.6	8.7
NESB immigrant or Indigenous	21.5#	16.9
Welfare recipient	62.9#	12.1
Number of Observations	3,364	13,289
Number of persons	1,006	3,149

Notes: # Difference between single and partnered mothers is statistically significant at the 5% level.

Further contextual information is provided in Table 3, which presents descriptive cross-sectional evidence on single-mother labour force status for all seven waves pooled together. Single mothers have a more dispersed age distribution than partnered mothers, with greater proportions aged under 25 and over 45, and a lower proportion aged 35-44. Single mothers are somewhat more likely to have no more than Year 10 qualifications, and are less likely to hold university qualifications, but they are more likely to hold non-university post-school qualifications than partnered mothers. They are more likely to be NESB immigrants or Indigenous. The biggest difference between lone parent and partnered mothers is that the rate of income support receipt of single mothers is nearly 63 per cent, compared with just over 12 per cent for partnered mothers. Despite these differences, it is clear that – were it not for their lone parent status – lone parent females would not be an especially disadvantaged group of labour market participants. That is, the differences with partnered mothers are not large.

Table 3a: Labour force status of mothers – All waves pooled (%)

	Single mothers	Partnered mothers
Full-time employed	25.1	26.0
Part-time employed	30.3#	40.9
Unemployed	6.9#	2.3
Not in labour force	37.7#	30.7
Number of Observations	3,364	13,289
Number of persons	1,006	3,149

Note: # Difference between single and partnered mothers is statistically significant at the 5% level.

Table 3b: Labour force status of single mothers – All waves pooled (%)

	Number of dependent children			Age of youngest child			
	1 child	2 children	3+ children	< 6 years	6-11 years	12-15 years	16+ years
Full-time employed	31.1	22.1	13.0	11.8	23.1	34.6	53.3
Part-time employed	30.0	32.1	27.8	23.3	39.7	32.5	23.4
Unemployed	7.4	6.2	7.0	7.4	7.6	6.7	4.8
Not in the labour force	31.5	39.7	52.2	57.5	29.6	26.3	18.5

Number of observations 3,364; Number of persons: 1,006.

Table 3a compares distributions of labour force status of single and partnered mothers. The rate of full-time employment is very similar, but unemployment and non-participation are considerably higher – and part-time employment correspondingly lower – among single mothers.

Table 3b examines single-mother labour force status by number of dependent children and by the age of the youngest child. The rate of part-time employment does not vary greatly by number of dependent children; nor does the proportion unemployed. However, full-time employment is strongly and negatively related to the number of dependent children, and non-

participation is correspondingly increasing in the number of dependent children. The rate of full-time employment is also strongly ordered by the age of the youngest child, rising from 12 per cent if the youngest child is under 6 years of age to 53 per cent if the youngest child is over 16 years of age. The rate of part-time employment is at a peak for single mothers with the youngest child in primary school (aged 6-11), thereafter declining as the age group of the youngest child increases. This decline is much smaller than the increase in the rate of full-time employment as the age of the youngest child increases, so that overall non-participation rate is strongly negatively ordered by age of youngest child.

Information on the extent and nature of labour force status transitions made by single mothers is presented in Table 4, which provides preliminary evidence on the extent to which part-time employment promotes or inhibits movements into full-time employment. It shows the proportion of lone parent females making each possible transition between three labour force states – full-time employed, part-time employed and not employed – from one wave (Wave  $t$ ) to the next wave (Wave  $t+1$ ). The main diagonal captures non-transitions, such that the estimates presented in the table sum to 100. Thus, for example, the top panel indicates that 19.9 per cent of single mothers were employed full-time in both Waves  $t$  and  $t+1$ , while 4.8 per cent moved from part-time employment in Wave  $t$  to full-time employment in Wave  $t+1$ , compared with 2.3 per cent moving from full-time employment to part-time employment. The sample for this analysis comprises all cases of wave-pairs in which a woman was a single mother in both waves. For comparison purposes, Table 4 also presents corresponding figures for partnered mothers.

Table 4: Transitions in labour force status (% in each transition combination – All wave-pairs pooled)

	Labour force status in Wave $t + 1$		
	Full-time	Part-time	Not employed
<i>Labour force status in Wave <math>t</math>:</i>			
<i>Single mothers</i>			
Full time employed	19.9	2.3	1.4
Part time employed	4.8	22.5	3.8
Not employed	2.3	6.5	36.7
<i>Partnered mothers</i>			
Full time employed	20.1	3.5	1.1
Part time employed	5.3	32.2	4.6
Not employed	1.5	6.8	25.0

Note: Number of observations (wave-pairs) for single-mothers sample: 2,285; Number of persons: 699. Number of observations for partnered mothers sample: 10,032; Number of persons: 2,505. Table uses labour force status at the time of interview to identify transitions. Estimates in each panel sum to 100%.



There is a high degree of persistence in labour force status evident: the numbers on the main diagonal are clearly the largest. Adding up the estimates for transitions between work and non-work, we find that 14 per cent of the sample makes a transition from one wave to the next.

Despite the high persistence in labour force status, some notable features of transition paths are evident in Table 4. The most popular transition paths from one wave to the next are from non-employment to part-time employment (6.5 per cent of single mothers) and from part-time employment to full-time employment (4.8 per cent). Also somewhat notable is that part-time employment is the main destination for those exiting full-time employment, with 2.3 per cent making that transition each year. It therefore seems that part-time employment does indeed play some kind of intermediate stepping stone function between non-employment and full-time employment, although we cannot infer from Table 4 that the individuals who move from non-participation to part-time employment are the same individuals making the transition from part-time employment to full-time employment.

Table 5 takes a longer – five-year – view of transition paths. It shows, for each initial labour force status group, the proportion moving into each of the other labour force status groups at some stage within the next four waves. The five-year periods from Waves 1, 2 and 3 are examined, with the sample for each initial wave comprising women who were single mothers (and respondents) in all five waves. Note that a single mother could have as many as four transitions over five waves and so could, in principle, move into both of the other labour force states. That is, it is theoretically possible for 100 per cent to move to each of the other labour force status destinations.

The table emphasises the importance of movements from non-employment to part-time employment and from part-time employment to full-time employment, with 41 per cent of those initially not employed moving into part-time employment at some stage in the next four years, and 37 per cent of those initially in part-time employment moving into full-time employment. The table also identifies several other notable aspects of labour force transitions made by single mothers. First, a high proportion (34 per cent) of those initially employed part-time move to non-employment at some stage of the next four waves. Second, a high proportion (27 per cent) of those initially employed full-time move to part-time employment in the subsequent four waves. Finally, it is evident that subsequent mobility across labour force states is greatest for those initially part-time employed and lowest for those initially employed full-time.

Table 5: Proportion making a transition to each labour force state within five years – By initial (Wave- $t$ ) labour force status (balanced panel) [single mothers in all 5 waves]

	<i>Destination labour force status</i>			No transition	No. of obs.
	Full time	Part time	Not employed		
<i>Initial (Wave <math>t</math>) labour force status</i>					
Full time	-	27.0%	15.8%	64.3%	126
Part time	36.5%	-	33.5%	40.4%	203
Not employed	15.2%	40.9%	-	44.7%	342

Note: Number of observations (cases): 671; Number of persons: 308. Table uses labour force status at the time of interview to identify transitions.

## 5. Dynamic random effects multinomial logit model

### *The model*

We estimate a dynamic random effects multinomial model of employment status to investigate the effects of part-time employment on transitions to full-time employment. The theoretical framework of the multinomial logit model has each individual  $i$  faced with  $J$  different choices at time  $t$ . The individual receives a certain level of utility from each choice and chooses the alternative that maximizes her utility. The current study assumes that each individual chooses between three employment states at each time  $t$ : not employed ( $y = 1$ ), working part time ( $y = 2$ ), and working full time ( $y = 3$ ).<sup>4</sup>

Ignoring individual heterogeneity, a multinomial logit model using a pooled sample assumes that individual's choices are independent, both within a choice (that is, for multiple observations across time of the same choice) and across all alternative choices made by the individual over time. The random effects specification relaxes the assumption that multiple observations within a choice are independent. With the random effects multinomial logit model, the choice probabilities for repeated choices made by an individual ( $i$ ) share the same unobserved random effects  $\alpha_i$ , where the individual-specific effects act as a random variable that produces a correlation among the residuals for the same individual within choices, but leaves the residuals independent across individuals. Furthermore, we attempt to relax the Independence of Irrelevant Alternatives (IIA) assumption by allowing individual random effects to be freely correlated across alternative choices.

The utility of choice  $j$  in time period  $t$  in a dynamic random effects context can be specified as:

<sup>4</sup> The 'not employed' category combines unemployment with non-participation in the labour force because sample sizes are not sufficient to support distinguishing unemployment as a separate category. Of course, an unemployed sole parent has arguably not made the *choice* to be not working, but this does not affect the validity of the econometric model or the interpretation of the results.

$$U_{ijt} = \beta'_j X_{it} + \gamma'_j y_{it-1} + \alpha_{ij} + \varepsilon_{ijt} \quad (1)$$

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 a lagged employment state (that may also be interacted with  $X_{it}$ ),  $\alpha_{ij}$  is time-invariant unobserved heterogeneity across individuals, and  $\varepsilon_{ijt}$  are independently and identically distributed error terms, assumed to be independent of  $X_{it}$  and  $\alpha_{ij}$ . As is standard in random-effects models, the unobserved heterogeneity  $\alpha_{ij}$  is also assumed to be independent of the explanatory variables  $X_{it}$ .

The dynamic multinomial logit model with random effects is thus specified as a modification of the random effects multinomial logit model (Gong, van Soest and Villagomez 2000), where the probability that  $y_{it}$  takes on the value  $j$  is

$$P(y_{it} = j | X_{it}, y_{it-1}, \alpha_i) = \frac{\exp(\beta'_j X_{it} + \gamma'_j y_{it-1} + \alpha_{ij})}{\sum_{k=1}^3 \exp(\beta'_k X_{it} + \gamma'_k y_{it-1} + \alpha_{ik})}, \quad i = 1, \dots, N; \quad t = 1, \dots, 7; \quad \text{and } j = 1, 2, 3 \quad (2)$$

where  $y$  is equal to 1 if not employed, 2 if employed part-time and 3 if employed full-time.  $\beta_j$  and  $\gamma_j$  are the parameters to be estimated from the data. Since the choice probabilities must sum to unity, a restriction is needed to ensure model identification. The elements of the vector  $\beta_1$  are set equal to zero. Additionally, for every individual in the sample, the unobserved heterogeneity term for the not employed outcome,  $\alpha_{i1}$ , is set equal to zero. The  $\alpha_i$  are assumed to independent and identically distributed according to a bivariate normal distribution with zero mean and variance–covariance matrix  $\Sigma_\alpha$ .<sup>5</sup>

The lagged dependent variable  $y_{it-1}$  introduces the well-known initial conditions problem, caused by our lack of knowledge of the data-generating process governing the initial observed choice (of labour force status) which depends on previous – unobserved – choices. If the individual initial conditions are correlated with the individual random effect  $\alpha_i$ , the estimator will be inconsistent and tend to overestimate coefficient  $\gamma$  (that is, overstate the effect of previous-year employment on current employment). Wooldridge (2005) suggests modelling

---

<sup>5</sup>  $\alpha_j$  are specified as linear combinations of independent variables assumed to have standard normal distributions, i.e.,  $\sim N(0,1)$ . Therefore, we have a  $(J \times 1)$  vector of  $\alpha_i = \Gamma \eta_i$ , with  $\eta_i \sim N(0, I)$ , where  $\Gamma$  is the lower triangular parameter matrix to be estimated, and the variance–covariance matrix of  $\alpha_i$  is given by  $\Sigma_\alpha = \Gamma \Gamma'$ .

the distribution of the unobserved effect ( $\alpha_i$ ) conditional on the initial value of the dependent variable ( $y_{i1}$ ) and any exogenous explanatory variables:

$$\alpha_i = \lambda y_{i1} + \phi \bar{x}_i + a_i \quad (3)$$

where  $\bar{x}_i$  is the average over the sample period of the observations on the exogenous variables, and a vector of  $a_i$  is bivariate normally distributed with mean zero and a variance–covariance matrix  $\Sigma_a$ , independent of  $\bar{x}_i$  and the initial condition  $y_{i1}$ . This also addresses the closely related issue of serially correlated heterogeneity (Chamberlain 1980; Mundlak 1978), which we address by including individual means for explanatory variables assessed as particularly likely to be affected by such heterogeneity.<sup>6</sup> Equation (3) is substituted into Equation (2), where the significance of coefficient  $\lambda$  indicates whether accounting for the endogeneity of the initial condition is relevant. In addition, we attempt to relax the IIA assumption by accommodating correlations in the individual random effects  $\alpha_i$  across alternative choices, because of the potential for each person’s tastes (unobservables) to be correlated across choices.<sup>7</sup>

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*. The marginal effects are simulated probabilities holding all other variables constant. Rather than report coefficient estimates from the logit model, mean marginal effects of the explanatory variables are reported. For the interacted binary variables – partner status, number of dependent children and age of youngest child dummy variables – we also report the ‘total’ mean marginal effect. This is given by the mean effect on the probability of employment state

---

<sup>6</sup> An alternative to the Wooldridge estimator is the Heckman estimator, which in essence models initial conditions as a function of exogenous – preferably pre-sample – factors as well as the factors included in the model for periods subsequent to the initial period. The Heckman estimator is technically more difficult to implement, and indeed does not appear to have been implemented in a multinomial panel logit setting. Available evidence suggests that, in our setting, the Wooldridge method will perform at least as well as the Heckman approach. For example, Arulampalam and Stewart (2008) find in a binomial setting that when the length of the panel is at least six periods and the number of observations is reasonably large – around 800 – the performance of the Heckman and Wooldridge estimators is similar. Similarly, Akay (2009) finds that the Wooldridge approach performs equally as well as the Heckman estimator in a binomial setting when the length of the panel is at least 5-8 waves. Although we are estimating multinomial models, with seven waves of data and 877 observations, we think it likely that the Wooldridge method will adequately account for initial conditions in our case.

<sup>7</sup> Following on from Footnote 5, to allow the random effects to be freely correlated, the  $J \times 1$  vector of non-zero  $\alpha_s$  is written as  $\alpha_i = \Gamma v_i$  where  $\Gamma$  is the lower triangular parameter matrix to be estimated and  $v_i$  is a standard normally distributed (mean vector  $0$ , covariance matrix  $I$ ) vector.

*j* of changing not only the relevant dummy from zero to one, but also changing it from zero to one in all its interactions. For example, the total marginal effect of ‘partnered’ is obtained by changing from zero to one the ‘partnered’ dummy and changing ‘partnered’ from zero to one in all its interactions with the number of dependent children and age of youngest child dummy variables.

### ***Explanatory variables***

Our key explanatory variables of interest are dummies for lagged labour force status – specifically, a dummy variable equal to one if the individual was employed full-time in the previous wave and a dummy variable equal to one if the individual was employed part-time in the previous wave. Lagged labour force status variables facilitate investigation of whether and to what extent transitions to full-time employment are helped or hindered by part-time employment. For example, a positive mean marginal effect estimate on the probability of full-time employment for the variable ‘employed part-time in the previous wave’ indicates part-time employment does play a stepping-stone role. Since our sample selection rule includes some observations of women when they are partnered, the lagged labour force status variables are interacted with current partner status to allow us to isolate the role of part-time employment for single mothers.<sup>8</sup>

We examine how the role of part-time employment depends on the number and ages of children by including interactions between the lagged labour force status variables and the variables included for resident children of the sample member. The children variables comprise ‘number of resident children under 18 years of age’ and ‘age of youngest resident child’. The variable for age of youngest resident child is set equal to zero if there are no resident children under 18 years of age, and a further dummy is included indicating the absence of any children under 18. These interaction terms are further interacted with current partner status.

The focus on the presence of non-adult children is based on the notion that it is care requirements of children that are the primary mechanism by which they affect labour supply,

---

<sup>8</sup> While our models control for current partner status, we do not consider effects of past partner status. For example, there is conceivably a case for including lagged partner status interacted with current partner status to capture effects of changes in partner status. The length of time spent in the current status – especially duration of sole parent status – may also be relevant. However, retrospective information on duration of lone parent status is not available for those who were previously in a de facto marriage.

and that these are not significant once children reach adulthood.<sup>9</sup> The a priori expectation is that labour supply is decreasing in the number of non-adult children under the single mothers' care and increasing in the age of the youngest child. This may translate to a (greater) stepping stone function of part-time employment as the number of non-adult children declines and the youngest child ages, but it need not. For example, even if fewer non-adult children and increases in the age of the youngest child act to increase labour supply, it is possible for effects to occur via increased movement move from non-participation to full-time employment rather than from part-time employment to full-time employment.

We also estimate alternative specifications which attempt to probe further the existence and nature of an 'age of youngest child' effect. However, in so doing, we confront a limitation of the econometric software we use – Limdep – which imposes a 100 parameter limit on these models, which translates to 50 explanatory variables. For these alternative specifications, to keep within this limitation, we omit the interactions between partner status and lagged labour force status. Effects for lagged labour force status will therefore in part reflect those experienced by mothers who have not yet separated from their partner or who have re-partnered.

First, we look for non-linearities in effects by including dummy variables rather than a single continuous variable, on the hypothesis that there are critical child ages that trigger changes in single mother labour supply. This specification includes the following dummies for age in years of the youngest resident child: less than 6 (the omitted dummy); 6 to 11; 12 to 15; and 16 or 17. As with the first specification, a dummy equal to one if no children under 18 are resident is included. These dummies are based on the notion that the critical ages are zero (i.e., the first year after birth), the ages of commencement of primary school and secondary school and the age at which children may first legally leave school, which also coincides with the child age at which eligibility for Parenting Payment Single ceases. Other candidate critical ages of course exist, but as noted, the econometric software does not support a large number of categories.

A further specification addresses the concern with the children variables that women who have not yet had children (women who become mothers for the first time after 2001 can appear in our sample) are pooled together with women who have had children but no longer

---

<sup>9</sup> Financial dependence of children may also influence labour supply, but this effect will not be well captured by whether a child is classified as dependent – that is, living with the parent and enrolled in full-time study. Models are therefore not attempting to capture this effect.

have any resident children under 18. If we are interested in the labour supply of single mothers once they no longer have significant caring responsibilities for their children, these two groups of women need to be distinguished. We therefore modify the above specification by creating a dummy variable equal to one if the sample member has not yet had a child and redefining the dummy indicating no resident children under 18 to be zero if the sample member has not yet had children. To keep within the 100-parameter limit, we combine the top two age of youngest child dummies together.

Additional explanatory variables are included primarily as controls. Parsimony was a key consideration here due to the constraints of the limited sample size of 556 and, more importantly, the 100-parameter restriction of *Limdep*. Demographic characteristics are captured by four age dummies, three dummies for place of birth and indigenous status (with immigrants from non-English speaking countries combined with indigenous women only because there are too few indigenous women in the sample to support their distinction), a dummy indicating residence in a major city and a dummy indicator of the presence of a long-term health condition that restricts the individual in everyday activities.<sup>10</sup> Measures of observable skill, primarily relevant for its effect on the (offer) wage, are provided by four dummy variables for educational attainment and a quadratic function of years spent in employment since completion of full-time study (to capture Mincerian on-the-job training effects). Variables for other factors anticipated to affect labour supply include household income from sources other than own labour, business or welfare receipt, the presence of housing costs (rent or mortgage commitments) and the presence of another household member with a disability, associated with which may be care requirements.<sup>11</sup>

We include a linear time trend to account for the general improvement in macroeconomic conditions over the period. Macroeconomic conditions were positive for the entire seven-year period, with the unemployment rate steadily declining, suggesting a linear trend is adequate to

---

<sup>10</sup> We also considered including the SF-36 self-reported general health measure (Ware et al, 2000), which is available in the HILDA data, but thought this may be more susceptible to endogeneity than reports of the presence of a specific long-term health condition.

<sup>11</sup> We also attempted to include measures of the degree of difficulty experienced with child care in the last 12 months. Households containing dependent children under 15 years of age are asked to rate from 0 to 10 the degree of difficulty they have experienced in the preceding twelve months in obtaining child care. Eleven different aspects of access to child care are rated, covering cost, quality, proximity, timing and other aspects of suitability. We aggregated responses to these questions, creating a variable that could in principle range between 0 for no difficulties to 110 for extreme difficulty with all aspects. However, there was a very high rate of non-response for these questions. A dummy indicator for the existence of a potential carer in the household was also considered, but was highly correlated with partner status and was insignificant.

capture time effects. However, significant policy changes affecting lone parents were introduced in July 2006.

Under these changes, for entrants to PPS after 30 June 2006, once the youngest child reaches 6 years of age, the parent is required to work for at least 15 hours per week, search for 15 hours of work or engage in another ‘approved’ activity. For those who entered PPS prior to 1 July 2006, these requirements commence once the youngest child reaches 7 years of age. At 8 years of age, a PPS recipient who commenced on PPS after 30 June 2006 is placed on Newstart Allowance, but with apparently similar participation requirements to those on PPS (the official publications are somewhat vague about the extent of the requirements – they appear to be flexible depending on circumstances). Newstart Allowance has a lower rate of payment (per fortnight: approx. \$495 vs \$575) and a less generous income test (per fortnight: free area of \$62, taper of 50 per cent up to \$252 and 60 per cent thereafter, compared with free area of \$142 plus \$24.60 per child and taper of 40 per cent). (Note that these figures exclude family payments and rent assistance, eligibility for which does not differ between the two payment types.) We therefore include a post-July 2006 dummy interacted with lone parent status to capture effects of welfare reforms introduced in July 2006 targeting lone parents. We also tested specifications that added interactions based on the age of the youngest child (6 and 8) but these were not significant and are excluded from the reported specifications because they required excluding other explanatory variables.

The reforms have arguably further encouraged part-time employment for those with children under 8 or those on benefits prior to 1 July 2006 and with children under 16; but they have potentially discouraged part-time employment, relative to the status quo, for those entering benefits after 30 June 2006 who have all children over 8 years of age.

Further specifications were also estimated with dummies for every wave to account for year effects; likewise, these were found to be not statistically significant (again with limited other covariates to satisfy the 100-parameter constraint).

As discussed earlier, we account for initial conditions and serially correlated unobserved heterogeneity using the Wooldridge (2005) approach, achieved by including initial values of the labour force status variables in estimation of the determinants of labour force status in all subsequent waves, and by including individual-level means of time-varying explanatory variables: disability, number of resident children under 18, location of residence, income, partner status and the interaction between number of dependent children and partner status.



## 6. Econometric model results

Table 7 presents the mean marginal effects estimates for the specification without correlated random effects (across labour force states), while Table 8 presents estimates for the specification with correlated random effects. Stars indicate statistical significance of the underlying coefficient estimates; consequently, statistical significance is not indicated for the ‘not employed’ category, for which the coefficients are all normalised to zero. Estimates are very similar for the two specifications, the main difference being that the estimates from the specification with correlated random effects across alternative choices have slightly lower statistical precision, which is to be expected given that it imposes less structure on the determination of labour force status. Given the similarities, we discuss the results for the two specifications together.

Estimates for skill variables are broadly consistent with expectations, higher education and greater work experience (up to about 10 years) translating to a greater probability of full-time employment and lower probability of non-employment. Estimates for housing costs and the presence of disability in the household are consistent with expectations but are not statistically significant. In terms of the demographic characteristics, age in excess of 45 years is associated with decreases in both full-time and part-time employment probabilities, while non-English speaking background or indigenous status is associated with lower part-time employment probability and a higher probability of non-employment. A long-term health condition on average increases the probabilities of both part-time employment and non-employment, while living in a major city increases the probabilities of both full-time and part-time employment. No significant effects on labour force status are found for partnering, although the mean marginal effects estimates imply a higher probability of full-time employment, a substantially lower probability of part-time employment and a slightly higher probability of non-employment.

Estimates for the effects of children on labour force status are consistent with expectations. Both the probability of full-time employment and the probability of part-time employment are decreasing in the number of children under 18 years of age. The probability of full-time employment is increasing in the age of the youngest child, while there is a small negative effect on the probability of part-time employment of the youngest child ageing. The absence of any resident children under 18 years of age on average increases the probability of full-time employment by 21 per cent, at the expense of both non-employment and part-time employment.

Table 7: Dynamic random effects multinomial logit model of labour force status – With uncorrelated random effects (uncorrelated across choices) – Mean marginal effects estimates

	Full time	Part time	Not employed
Age- 25-34	-0.01%	0.00%	0.01%
Age- 35-44	-4.74%*	1.61%	3.13%
Age- 45 and above	-8.09%***	-3.60%***	11.69%
ESB immigrant	-2.33%*	-1.15%	3.48%
NESB immigrant or indigenous	0.47%	-5.33%***	4.86%
Live in major city	8.61%***	4.62%***	-13.22%
Long term health condition	-8.47%***	3.26%	5.21%
Education - Year 11-12	-0.34%	0.93%	-0.58%
Education - Certificate or diploma	4.87%***	-1.20%	-3.66%
Education - Degree and above	7.99%***	0.82%***	-8.81%
Years of work experience	0.67%***	0.71%***	-1.38%
Years of work experience <sup>2</sup> /10	-0.83%***	-1.47%***	2.31%
H/hold income (excl. own labour and welfare income)	0.11%	0.47%*	-0.58%
No housing costs (own outright or rent free)	-1.72%	-0.03%	1.75%
Disability in household	0.75%	-1.87%	1.12%
No. of resident children < 18	-3.54%***	0.83%	2.72%
Age of youngest resident child	1.19%***	-0.02%***	-1.17%
No resident children < 18	20.60%***	-5.35%***	-15.26%
Partnered	3.13%	-3.97%	0.84%
Partnered x no. of resident children < 18	0.25%	0.87%	-1.12%
Partnered x age of youngest resident child	-0.47%	-0.13%	0.61%
Partnered and no resident children < 18	2.10%	-6.29%	4.20%
Year	-0.52%	0.00%	0.52%
Year>=2006	2.55%*	1.25%	-3.79%
Lone parent x Year>=2006	1.93%	-1.92%	-0.01%
FT <sub>t-1</sub>	41.01%***	-24.07%	-16.94%
PT <sub>t-1</sub>	6.31%***	23.86%***	-30.18%
FT <sub>t-1</sub> x no. of resident children < 18	0.30%	4.60%**	-4.91%
PT <sub>t-1</sub> x no. of resident children < 18	0.87%	-1.75%	0.88%
FT <sub>t-1</sub> x age of youngest resident child	0.04%	0.13%	-0.17%
FT <sub>t-1</sub> & no resident children < 18	-5.29%	21.75%**	-16.46%
PT <sub>t-1</sub> x age of youngest resident child	-0.69%	1.00%*	-0.31%
PT <sub>t-1</sub> & no resident children < 18	-8.44%	17.92%**	-9.48%
FT <sub>t-1</sub> , currently partnered	-5.47%	-1.89%	7.36%
PT <sub>t-1</sub> , currently partnered	-5.08%	4.26%	0.82%
FT <sub>t-1</sub> x no. of resident children < 18, currently partnered	2.74%	-1.91%	-0.83%
PT <sub>t-1</sub> x no. of resident children < 18, currently partnered	0.97%	-1.43%	0.46%
FT <sub>t-1</sub> x age of youngest resident child, currently partnered	0.38%	1.72%**	-2.10%
FT <sub>t-1</sub> & no resident children < 18, currently partnered	2.36%	1.40%	-3.76%
PT <sub>t-1</sub> x age of youngest resident child, currently partnered	0.70%	-0.70%	0.00%
PT <sub>t-1</sub> & no resident children < 18, currently partnered	-1.93%	-6.28%	8.21%
FT <sub>1</sub>	10.40%***	-2.44%**	-7.96%
PT <sub>1</sub>	3.75%***	5.21%***	-8.96%
Mean 'long-term health condition'	-0.47%***	-0.88%***	1.35%
Mean 'no. of resident children < 18'	1.04%	0.99%	-2.03%
Mean 'live in major city'	-0.61%***	-0.69%***	1.30%
Mean 'h/hold income'	-0.86%**	-0.07%	0.93%
Mean 'partnered'	-0.25%	0.49%	-0.24%
Mean 'partnered x no. of resident children < 18'	3.40%*	-1.89%	-1.51%

Note: \*\*\*, \*\* and \* denote significance of the underlying coefficient estimate at the 1%, 5% and 10% levels, respectively. Sample size: 4205; Log-likelihood: -2567.527.

Table 8: Dynamic random effects multinomial logit model of labour force status – With correlated random effects (correlated across choices) – Mean marginal effects estimates

	Full time	Part time	Not employed
Age- 25-34	0.00%	-0.02%	0.02%
Age- 35-44	-4.77%*	1.60%	3.18%
Age- 45 and above	-8.17%***	-3.72%***	11.89%
ESB immigrant	-2.40%*	-1.28%	3.67%
NESB immigrant or indigenous	0.38%	-5.33%***	4.95%
Live in major city	8.69%***	4.87%***	-13.55%
Long term health condition	-8.46%***	3.17%	5.29%
Education - Year 11-12	-0.24%	0.85%	-0.61%
Education - Certificate or diploma	5.01%***	-1.12%	-3.89%
Education - Degree and above	8.13%***	0.88%***	-9.00%
Years of work experience	0.67%***	0.73%***	-1.40%
Years of work experience <sup>2</sup> /10	-0.83%***	-1.49%***	2.32%
H/hold income (excl. own labour and welfare income)	0.11%	0.47%	-0.58%
No housing costs (own outright or rent free)	-1.79%	-0.17%	1.97%
Disability in household	0.75%	-1.83%	1.08%
No. of resident children < 18	-3.58%**	0.83%	2.75%
Age of youngest resident child	1.21%***	-0.02%***	-1.19%
No resident children < 18	21.06%***	-5.48%**	-15.58%
Partnered	3.11%	-3.99%	0.88%
Partnered x no. of resident children < 18	0.33%	0.82%	-1.15%
Partnered x age of youngest resident child	-0.48%	-0.11%	0.59%
Partnered and no resident children < 18	2.07%	-6.24%	4.17%
Year	-0.53%	0.04%	0.49%
Year>=2006	2.62%	1.27%	-3.89%
Lone parent x Year>=2006	1.88%	-1.93%	0.05%
FT <sub>t-1</sub>	40.20%***	-24.79%	-15.41%
PT <sub>t-1</sub>	5.76%***	23.27%***	-29.03%
FT <sub>t-1</sub> x no. of resident children < 18	0.34%	4.56%*	-4.90%
PT <sub>t-1</sub> x no. of resident children < 18	0.89%	-1.80%	0.91%
FT <sub>t-1</sub> x age of youngest resident child	0.03%	0.16%	-0.19%
FT <sub>t-1</sub> & no resident children < 18	-5.37%	21.84%**	-16.47%
PT <sub>t-1</sub> x age of youngest resident child	-0.69%	1.00%	-0.31%
PT <sub>t-1</sub> & no resident children < 18	-8.58%	17.74%**	-9.16%
FT <sub>t-1</sub> , currently partnered	-5.42%	-1.98%	7.40%
PT <sub>t-1</sub> , currently partnered	-5.02%	4.34%	0.68%
FT <sub>t-1</sub> x no. of resident children < 18, currently partnered	2.58%	-1.93%	-0.65%
PT <sub>t-1</sub> x no. of resident children < 18, currently partnered	0.87%	-1.36%	0.49%
FT <sub>t-1</sub> x age of youngest resident child, currently partnered	0.39%	1.72%**	-2.11%
FT <sub>t-1</sub> & no resident children < 18, currently partnered	2.40%	1.50%	-3.90%
PT <sub>t-1</sub> x age of youngest resident child, currently partnered	0.70%	-0.72%	0.03%
PT <sub>t-1</sub> & no resident children < 18, currently partnered	-1.92%	-6.14%	8.06%
FT <sub>1</sub>	10.78%***	-1.91%**	-8.88%
PT <sub>1</sub>	4.13%***	5.55%***	-9.68%
Mean 'long-term health condition'	-0.49%***	-0.91%***	1.40%
Mean 'no. of resident children < 18'	1.05%	0.93%	-1.99%
Mean 'live in major city'	-0.62%***	-0.72%***	1.34%
Mean 'h/hold income'	-0.88%**	-0.08%	0.96%
Mean 'partnered'	-0.24%	0.48%	-0.24%
Mean 'partnered x no. of resident children < 18'	3.46%	-1.80%	-1.66%

Note: \*\*\*, \*\* and \* denote significance of the underlying coefficient estimate at the 1%, 5% and 10% levels, respectively. Sample size: 4205; Log-likelihood: -2566.768.

No significant time trend is evident. The dummy indicator for the post-July 2006 period shows a weakly significant positive effect on the full-time employment probability, while the interaction with lone parent status, although insignificant, indicates that the effect was stronger for lone mothers than partnered mothers. The point estimates also imply that the probability of part-time employment also decreased for lone mothers compared to partnered mothers in the post-Welfare-to-Work period, although this is not statistically significant.

The key estimates in Tables 7 and 8 are those for the mean marginal effect of part-time employment in the previous wave ( $PT_{t-1}$ ) on the probability of full-time employment. A stepping stone function is indeed evident, with the mean marginal effect estimate implying part-time employment in the previous wave on average increases the probability of full-time employment by 0.063 (Table 7) or 0.058 (Table 8). Perhaps somewhat surprisingly, no significant differences in this stepping stone function are evident by number of children or age of youngest child. Notwithstanding the insignificance of the interaction terms, aggregating across the  $PT_{t-1}$  variable and its relevant interaction terms for single mothers<sup>12</sup>, the point estimate in the uncorrelated random effects model imply part-time employment in the previous wave on average increases the probability of full-time employment in the current wave by 4.8 percentage points (a lower estimate, reflecting negative estimated impacts of age of youngest child and number of children). For the correlated random effects model, the corresponding estimate is 4.1.

Results of alternative specifications are presented in Tables 9 and 10. These specifications contain alternative sets of variables to capture effects of resident children. Only estimates for the child and lagged labour force status variables are presented in the tables, with all additional results presented in the Appendix. In Table 9 we consider dummies for the age of the youngest child in place of the linear term for age of youngest child. As in the first specification, differences by age of youngest child are not significant, although the estimates do suggest the stepping stone function is declining in the age of the youngest child (and indeed non-existent when the youngest is in high school). Note, however, that because the interactions between lagged labour force status and current partner status have been omitted from this specification, these effects relate to combined effects for single mothers and those who have re-partnered.

---

<sup>12</sup> The non-linearity of the logit model means that these estimates of aggregate effects are approximate only.

Table 9: Dynamic random effects multinomial logit model of labour force status – With dummies for age of youngest child – Selected mean marginal effects estimates

With uncorrelated random effects (uncorrelated across choices)			
	Full time	Part time	Not employed
No. of resident children < 18	-3.04% **	0.30%	2.74%
Age of youngest resident child 6-11	-3.28%	10.88% ***	-7.61%
Age of youngest resident child 12-15	11.60% ***	-1.56% **	-10.04%
Age of youngest resident child 16-17	21.82% ***	-7.19%	-14.64%
No resident children < 18	14.08% ***	-2.72% **	-11.36%
FT <sub>t-1</sub>	39.76% ***	-24.91%	-14.85%
PT <sub>t-1</sub>	3.84% ***	28.34% ***	-32.18%
FT <sub>t-1</sub> x no. of resident children < 18	0.47% **	5.37% ***	-5.84%
PT <sub>t-1</sub> x no. of resident children < 18	0.91%	-1.88%	0.97%
FT <sub>t-1</sub> & age of youngest 6-11	8.68% **	-1.05%	-7.63%
FT <sub>t-1</sub> & age of youngest 12-15	-4.12%	9.91%	-5.79%
FT <sub>t-1</sub> & age of youngest 16-17	-0.92%	8.35%	-7.43%
FT <sub>t-1</sub> & no resident children < 18	-5.61%	23.42% ***	-17.81%
PT <sub>t-1</sub> & age of youngest 6-11	1.25%	-0.06%	-1.19%
PT <sub>t-1</sub> & age of youngest 12-15	-6.44%	9.15%	-2.71%
PT <sub>t-1</sub> & age of youngest 16-17	-8.82%	16.94%	-8.12%
PT <sub>t-1</sub> & no resident children < 18	-7.67%	12.68% *	-5.01%
With correlated random effects (correlated across choices)			
	Full time	Part time	Not employed
No. of resident children < 18	-3.06% **	0.29%	2.77%
Age of youngest resident child 6-11	-3.12%	10.92% ***	-7.80%
Age of youngest resident child 12-15	11.78% ***	-1.60% **	-10.18%
Age of youngest resident child 16-17	21.88% ***	-7.06%	-14.83%
No resident children < 18	14.41% ***	-2.76% **	-11.65%
FT <sub>t-1</sub>	38.98% ***	-25.60%	-13.38%
PT <sub>t-1</sub>	3.24% ***	27.74% ***	-30.99%
FT <sub>t-1</sub> x no. of resident children < 18	0.45% *	5.29% ***	-5.74%
PT <sub>t-1</sub> x no. of resident children < 18	0.90%	-1.90%	1.00%
FT <sub>t-1</sub> & age of youngest 6-11	8.51% **	-0.93%	-7.58%
FT <sub>t-1</sub> & age of youngest 12-15	-4.11%	10.20%	-6.09%
FT <sub>t-1</sub> & age of youngest 16-17	-0.88%	8.62%	-7.74%
FT <sub>t-1</sub> & no resident children < 18	-5.67%	23.41% ***	-17.73%
PT <sub>t-1</sub> & age of youngest 6-11	1.10%	-0.15%	-0.95%
PT <sub>t-1</sub> & age of youngest 12-15	-6.42%	9.14%	-2.73%
PT <sub>t-1</sub> & age of youngest 16-17	-8.75%	16.98%	-8.23%
PT <sub>t-1</sub> & no resident children < 18	-7.81%	12.57%	-4.75%

Note: \*\*\*, \*\* and \* denote significance of the underlying coefficient estimate at the 1%, 5% and 10% levels, respectively.

In Table 10 we allow effects of part-time employment in the previous wave for those with grown-up children to differ from effects for those who have not yet had children. The mean marginal effect estimate for part-time employment in the previous wave for women who no longer have any children under 18 resident with them is similar to the Table 9 specification. A weakly significant negative effect of part-time employment in the previous wave on the probability of full-time employment is evident for single women who have not yet had a child, which is likely to reflect the effects of childbirth subsequent to the wave in which the woman was employed part-time.

Table 10: Dynamic random effects multinomial logit model of labour force status – Distinguishing yet-to-be mothers from mothers with no resident children – Selected mean marginal effects estimates

With uncorrelated random effects (uncorrelated across choices)			
	Full time	Part time	Not employed
No. of resident children < 18	-3.14%***	0.34%	2.80%
Age of youngest resident child 6-11	-2.89%	10.41%***	-7.52%
Age of youngest resident child 12-17	13.90%***	-2.94%**	-10.96%
No resident children < 18	13.91%***	-5.53%	-8.38%
Not yet had children	13.59%***	6.20%***	-19.80%
FT <sub>t-1</sub>	41.14%***	-25.91%	-15.23%
PT <sub>t-1</sub>	3.93%***	28.41%***	-32.33%
FT <sub>t-1</sub> x no. of resident children < 18	0.33%**	5.56%***	-5.90%
PT <sub>t-1</sub> x no. of resident children < 18	0.92%	-1.97%	1.05%
FT <sub>t-1</sub> & age of youngest 6-11	8.71%**	-1.09%	-7.62%
FT <sub>t-1</sub> & age of youngest 12-17	-2.64%	9.72%	-7.08%
FT <sub>t-1</sub> & no resident children < 18	-3.64%**	24.42%***	-20.78%
FT <sub>t-1</sub> & have not yet had a child	-17.77%*	26.39%	-8.62%
PT <sub>t-1</sub> & age of youngest 6-11	1.32%	-0.02%	-1.30%
PT <sub>t-1</sub> & age of youngest 12-17	-6.92%	10.85%*	-3.93%
PT <sub>t-1</sub> & no resident children < 18	-9.09%	19.15%***	-10.07%
PT <sub>t-1</sub> & have not yet had a child	-6.55%	-4.08%	10.63%
With correlated random effects (correlated across choices)			
	Full time	Part time	Not employed
No. of resident children < 18	-3.16%***	0.31%	2.84%
Age of youngest resident child 6-11	-2.75%	10.43%***	-7.68%
Age of youngest resident child 12-17	14.03%***	-3.04%**	-10.99%
No resident children < 18	14.10%***	-5.64%	-8.46%
Not yet had children	14.21%***	6.18%***	-20.39%
FT <sub>t-1</sub>	40.27%***	-26.62%	-13.65%
PT <sub>t-1</sub>	3.31%***	27.77%***	-31.08%
FT <sub>t-1</sub> x no. of resident children < 18	0.32%*	5.48%***	-5.80%
PT <sub>t-1</sub> x no. of resident children < 18	0.92%	-2.00%	1.08%
FT <sub>t-1</sub> & age of youngest 6-11	8.55%**	-0.96%	-7.59%
FT <sub>t-1</sub> & age of youngest 12-17	-2.61%	10.06%	-7.45%
FT <sub>t-1</sub> & no resident children < 18	-3.62%*	24.36%***	-20.74%
FT <sub>t-1</sub> & have not yet had a child	-18.01%	26.50%	-8.49%
PT <sub>t-1</sub> & age of youngest 6-11	1.18%	-0.12%	-1.06%
PT <sub>t-1</sub> & age of youngest 12-17	-6.86%	10.86%	-3.99%
PT <sub>t-1</sub> & no resident children < 18	-9.13%	18.88%**	-9.76%
PT <sub>t-1</sub> & have not yet had a child	-6.84%	-4.34%	11.18%

Note: \*\*\*, \*\* and \* denote significance of the underlying coefficient estimate at the 1%, 5% and 10% levels, respectively.

### *Are lagged labour force status variables capturing effects of changes in partner status?*

One potential concern with the estimates presented in Tables 7-10 is that the effects attributed to lagged labour force status could in part derive from changes in partner status. In particular, if separation from partner is often associated with a movement from part-time to full-time employment, effects attributed to lagged part-time employment for lone parents may in fact be partially driven by separation from partner. Given constraints on the number of parameters in our models, rather than estimate specifications with lagged partner status and with interactions between lagged partner status and lagged labour force status, in Table 11 we

describe transitions in both labour force status and partner status among members of our regression sample. The table shows that partnered women employed part-time who separated from one wave to the next were no more likely—in fact, were slightly less likely—to move into full-time employment versus move into non-employment. Thus, it does not appear that the stepping stone effect we identify could be driven by changes in partner status causing changes in labour force status.

Table 11: Transitions in labour force status and partnered status (% in each transition combination) for regression sample – All wave-pairs pooled

	Labour force and partnered status in Wave $t + 1$					
	Single, Full time employed	Single, Part time employed	Single, Not working	Partnered, Full time employed	Partnered, Part time employed	Partnered, Not working
Labour force and partnered status in Wave $t$ :						
Single, Full time employed	12.6	1.5	0.9	0.9	0.1	0.2
Single, Part time employed	3.0	14.7	2.5	0.4	1.2	0.5
Single, Not working	1.4	4.1	22.1	0.1	0.5	2.1
Partnered, Full time employed	1.3	0.3	0.2	4.2	0.8	0.4
Partnered, Part time employed	<b>0.3</b>	2.1	<b>0.4</b>	1.2	4.9	1.2
Partnered, Not working	0.2	0.9	2.9	0.4	1.6	7.9

Note: Number of observations (wave-pairs): 3,328; Number of persons: 877. Table uses labour force status at the time of interview to identify transitions. Estimates sum to 100%.

### *Declining underemployment between 2001 and 2007?*

The 2001 to 2007 period was one of employment growth, the aggregate unemployment rate (seasonally adjusted) falling from 7.1 per cent in October 2001 to 4.4 per cent in October 2007 (ABS, 2009). If involuntary part-time employment of single mothers – that is, employment part-time of single mothers who prefer full-time employment – was correspondingly declining, it is conceivable that this could lead to spurious inferences on the effects of part-time employment on likelihood of movement into full-time employment.

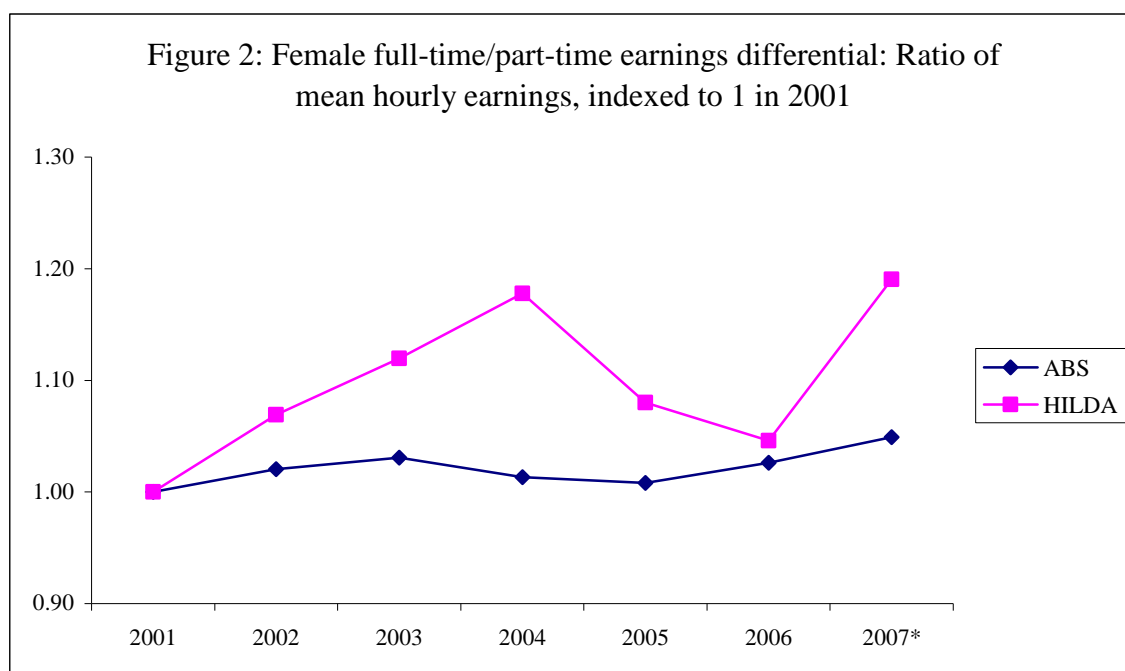
Table 12 indicates that involuntary part-time employment of part-time employed female lone parents did not in fact decline over the period, remaining at approximately one-fifth of part-time employed single mothers across the seven waves. Among non-employed single mothers, the proportion wanting full-time employment did decline, from 19 per cent to 12 per cent. The implications of this decline are ambiguous, but to the extent that it was the result of success of non-employed lone mothers in obtaining full-time employment, it would imply improvements in macroeconomic conditions actually attenuated our estimates of the effects of part-time employment on movements into full-time employment.

Table 12: Proportion wanting full-time employment (35 or more hours per week) (%)

	Wave 1	Wave 2	Wave 3	Wave 4	Wave 5	Wave 6	Wave 7
Part-time employed single mothers	18.7	15.6	19.8	20.4	18.1	19.9	19.1
Non-employed single mothers	19.3	18.1	16.0	15.2	15.8	16.6	12.3

### *What role have changes in (relative) wages played?*

Wage rates on offer play a key role in labour supply decisions, but have been absent from our analysis to date. They are implicit in our models, to some extent accounted for by inclusion of explanatory variables that embody observable skills. However, the potential exists for relative wage rates on offer to have changed over time, and more particularly have changed for full-time employment relative to part-time employment. A year time trend is included in our models, but it may be that our inferences are in part reflecting changes in relative wage rates on offer in part-time employment vis-à-vis full-time employment. Figure 2 shows some volatility in relative pay rates (realised in employment) evident in the HILDA data. Although estimates from ABS data obtained from firm surveys exhibit less volatility, there is nonetheless some change over time and overall a slight increase in the mean wage rate in full-time employment relative to part-time employment.



Sources: ABS: Average weekly earnings of female employees divided by average weekly hours paid for (6310.0 and 6291.0 time series spreadsheets, 2009); HILDA: Mean hourly earnings of female employees in main job.

Note: \* In 2007, the ABS data include salary sacrifice amounts. Prior to 2007, salary sacrifice amounts were not explicitly included.

Full-time employment has thus become a slightly more attractive option compared with part-time employment over the sample period. This might suggest that the apparent stepping stone



function found for part-time employment is partly due to increased numbers of single mothers moving from part-time to full-time employment due to the relatively higher wages on offer in full-time employment towards the end of the sample period. However, it is important to note that the increased attractiveness of full-time employment applies equally to those not employed as to those employed part-time. This relative increase in wages therefore need not affect the relative probability of moving from part-time employment to full-time employment versus moving from non-employment to full-time employment—which is what the coefficient estimate on the lagged part-time employment variable measures.

## **7. Conclusion**

Descriptive analysis shows that transitions between non-employment and employment are not particularly frequent for sole parent females. Over the 2001-2007 period, on average fewer than 9% moved from non-employment to employment from one year to the next, and just over 5% moved from employment to non-employment. There are, however, indications that moves from non-employment to part-time employment, and from part-time employment to full-time employment, are the most frequent of the transition paths of single mothers. This provides circumstantial evidence that part-time work is something of a stepping stone from non-employment to full-time employment.

Panel models indeed provide clear evidence that part-time work is more help than hindrance to transitions to full-time employment. Estimates imply that part-time employment in the previous wave on average increases the probability of full-time employment in the current wave by approximately 6 percentage points. No significant differences in the effects of part-time employment by age of youngest child and number of children are evident. This does not mean these factors are unimportant to labour force status. Far from it; estimates show large effects of these factors on labour force status. It is simply that no evidence is found that the stepping stone function of part-time employment depends on these factors. Nonetheless, this is somewhat surprising, since we might expect the stepping stone function to only arise when single mothers are in a better position to move into full-time employment. However, given the limited sample size and the relatively large size of the estimated mean marginal effects, it is quite possible that economically (but in our case not statistically) significant effects do in fact exist.

From a policy perspective, facilitating part-time employment of lone parent welfare recipients does not seem to be promoting entrenched welfare reliance – at least if one assumes that the

alternative to part-time employment for welfare recipient lone mothers is non-employment (rather than full-time employment). Of course, full-time employment may actually be more prevalent among lone mothers in the absence of the facilitation of combining welfare with part-time employment. Moreover, transitions from part-time to full-time employment may be accelerated by a policy framework that actively encourages such transitions. Indeed, arguably this is what the July 2006 welfare reforms are seeking to achieve by making part-time employment progressively less ‘comfortable’ as the children age.

## Appendix

Table A1: Regression sample means

	Labour force status			
	Employed full-time	Employed part-time	Not employed	All persons
Aged 15-24	0.04	0.06	0.15	0.09
Aged 25-34	0.17	0.23	0.32	0.25
Aged 35-44	0.36	0.40	0.27	0.34
Aged 45 and above	0.43	0.30	0.26	0.32
Aus-born non-indigenous	0.72	0.79	0.68	0.72
ESB immigrant	0.11	0.10	0.08	0.09
NESB immigrant or indigenous	0.17	0.11	0.24	0.18
Education < Year 11	0.17	0.25	0.38	0.28
Education - Year 11-12	0.17	0.24	0.27	0.23
Education - Certificate or diploma	0.33	0.33	0.28	0.31
Education - Degree and above	0.33	0.18	0.07	0.18
Long term health condition	0.06	0.11	0.28	0.17
Disability in household	0.12	0.15	0.32	0.21
No. of resident children < 18	1.08	1.43	1.50	1.36
Age of youngest child (missing if no child < 18)	10.10	8.29	5.98	7.74
Have not yet had a child	0.03	0.04	0.03	0.03
Age of youngest 0-5	0.16	0.26	0.46	0.31
Age of youngest 6-11	0.24	0.34	0.23	0.27
Age of youngest 12-15	0.20	0.18	0.11	
Age of youngest 16-17	0.11	0.06	0.03	0.06
No resident children < 18 (excl not yet had child)	0.26	0.13	0.14	0.17
Living in major city	0.66	0.56	0.56	0.59
Years of work experience	19.53	15.51	8.83	13.89
H/hold income	15519.88	19959.78	18036.18	17934.25
No housing costs	0.19	0.19	0.16	0.18
Partnered	0.27	0.28	0.28	0.28
<i>Lone parent status</i>				
Lone parent with resident children < 18	0.52	0.60	0.60	0.58
Mother, single, no resident children < 18	0.21	0.10	0.12	0.14
Partnered parent with resident children < 18	0.19	0.24	0.23	0.22
Mother, partnered, no resident children < 18	0.04	0.03	0.02	0.03
Single, not yet had children	0.02	0.03	0.02	0.02
Partnered, not yet had children	0.02	0.01	0.01	0.01

Table A2a: Dynamic random effects multinomial logit model of labour force status – With uncorrelated random effects (uncorrelated across choices) – With dummies for age of youngest child – Additional mean marginal effects estimates

	Full time	Part time	Not employed
Age- 25-34	0.82%	-0.27%	-0.55%
Age- 35-44	-3.00%	1.41%	1.59%
Age- 45 and above	-6.61%***	-2.68%**	9.30%
ESB immigrant	-2.48%**	-1.27%	3.75%
NESB immigrant or indigenous	0.42%	-5.34%***	4.92%
Live in major city	8.60%***	4.97%***	-13.57%
Long term health condition	-8.71%***	3.58%	5.14%
Education - Year 11-12	-0.90%	1.22%	-0.32%
Education - Certificate or diploma	4.49%***	-1.01%	-3.48%
Education - Degree and above	7.74%***	0.99%***	-8.73%
Years of work experience	0.65%***	0.70%***	-1.35%
Years of work experience <sup>2</sup> /10	-0.82%***	-1.42%***	2.24%
H/hold income (excl. own labour and welfare income)	0.12%	0.43%*	-0.54%
No housing costs (own outright or rent free)	-1.51%	-0.18%	1.69%
Disability in household	0.86%	-2.04%	1.18%
No. of resident children < 18	-3.04%**	0.30%	2.74%
Age of youngest resident child 6-11	-3.28%	10.88%***	-7.61%
Age of youngest resident child 12-15	11.60%***	-1.56%**	-10.04%
Age of youngest resident child 16-17	21.82%***	-7.19%	-14.64%
No resident children < 18	14.08%***	-2.72%**	-11.36%
Partnered	-1.61%	-1.56%	3.17%
Partnered x no. of resident children < 18	0.94%	0.53%	-1.46%
Partnered x age of youngest resident child 6-11	3.45%	-8.64%**	5.20%
Partnered x age of youngest resident child 12-15	-0.47%	-2.52%	2.99%
Partnered x age of youngest resident child 16-17	-7.67%*	-5.05%	12.72%
Partnered x no resident children < 18	4.17%	-9.35%*	5.18%
Year	0.06%	-0.23%	0.16%
Year>=2006	1.06%	1.95%	-3.01%
Lone parent x Year>=2006	1.94%	-1.86%	-0.08%
FT <sub>t-1</sub>	39.76%***	-24.91%	-14.85%
PT <sub>t-1</sub>	3.84%***	28.34%***	-32.18%
FT <sub>t-1</sub> x no. of resident children < 18	0.47%**	5.37%***	-5.84%
PT <sub>t-1</sub> x no. of resident children < 18	0.91%	-1.88%	0.97%
FT <sub>t-1</sub> & age of youngest 6-11	8.68%**	-1.05%	-7.63%
FT <sub>t-1</sub> & age of youngest 12-15	-4.12%	9.91%	-5.79%
FT <sub>t-1</sub> & age of youngest 16-17	-0.92%	8.35%	-7.43%
FT <sub>t-1</sub> & no resident children < 18	-5.61%	23.42%***	-17.81%
PT <sub>t-1</sub> & age of youngest 6-11	1.25%	-0.06%	-1.19%
PT <sub>t-1</sub> & age of youngest 12-15	-6.44%	9.15%	-2.71%
PT <sub>t-1</sub> & age of youngest 16-17	-8.82%	16.94%	-8.12%
PT <sub>t-1</sub> & no resident children < 18	-7.67%	12.68%*	-5.01%
FT <sub>1</sub>	10.33%***	-2.82%*	-7.51%
PT <sub>1</sub>	3.69%***	5.07%***	-8.76%
Mean 'long-term health condition'	-0.49%***	-0.89%***	1.38%
Mean 'no. of resident children < 18'	1.26%	0.66%	-1.92%
Mean 'live in major city'	-0.61%***	-0.73%***	1.34%
Mean 'h/hold income'	-0.87%**	0.05%	0.82%
Mean 'partnered'	-0.32%	0.58%	-0.25%
Mean 'partnered x no. of resident children < 18'	3.40%*	-1.98%	-1.42%

Note: \*\*\*, \*\* and \* denote significance of the underlying coefficient estimate at the 1%, 5% and 10% levels, respectively. Sample size: 4205; Log-likelihood: -2575.827.

Table A2b: Dynamic random effects multinomial logit model of labour force status – With uncorrelated random effects (correlated across choices) – With dummies for age of youngest child – Additional mean marginal effects estimates

	Full time	Part time	Not employed
Age- 25-34	0.81%	-0.27%	-0.54%
Age- 35-44	-3.02%	1.39%	1.63%
Age- 45 and above	-6.68%***	-2.81%**	9.49%
ESB immigrant	-2.53%*	-1.44%	3.97%
NESB immigrant or indigenous	0.32%	-5.32%***	5.01%
Live in major city	8.72%***	5.23%***	-13.95%
Long term health condition	-8.73%***	3.48%	5.25%
Education - Year 11-12	-0.78%	1.13%	-0.35%
Education - Certificate or diploma	4.64%***	-0.94%	-3.71%
Education - Degree and above	7.86%***	1.06%***	-8.92%
Years of work experience	0.66%***	0.72%***	-1.38%
Years of work experience <sup>2</sup> /10	-0.82%**	-1.44%***	2.26%
H/hold income (excl. own labour and welfare income)	0.12%	0.42%	-0.54%
No housing costs (own outright or rent free)	-1.61%	-0.31%	1.92%
Disability in household	0.88%	-2.01%	1.14%
No. of resident children < 18	-3.06%**	0.29%	2.77%
Age of youngest resident child 6-11	-3.12%	10.92%***	-7.80%
Age of youngest resident child 12-15	11.78%***	-1.60%**	-10.18%
Age of youngest resident child 16-17	21.88%***	-7.06%	-14.83%
No resident children < 18	14.41%***	-2.76%**	-11.65%
Partnered	-1.61%	-1.51%	3.12%
Partnered x no. of resident children < 18	0.91%	0.53%	-1.44%
Partnered x age of youngest resident child 6-11	3.50%	-8.55%**	5.05%
Partnered x age of youngest resident child 12-15	-0.48%	-2.45%	2.93%
Partnered x age of youngest resident child 16-17	-7.71%*	-5.01%	12.72%
Partnered x no resident children < 18	4.15%	-9.22%*	5.07%
Year	0.04%	-0.16%	0.13%
Year>=2006	1.17%	1.89%	-3.06%
Lone parent x Year>=2006	1.93%	-1.86%	-0.07%
FT <sub>t-1</sub>	38.98%***	-25.60%	-13.38%
PT <sub>t-1</sub>	3.24%***	27.74%***	-30.99%
FT <sub>t-1</sub> x no. of resident children < 18	0.45%*	5.29%***	-5.74%
PT <sub>t-1</sub> x no. of resident children < 18	0.90%	-1.90%	1.00%
FT <sub>t-1</sub> & age of youngest 6-11	8.51%**	-0.93%	-7.58%
FT <sub>t-1</sub> & age of youngest 12-15	-4.11%	10.20%	-6.09%
FT <sub>t-1</sub> & age of youngest 16-17	-0.88%	8.62%	-7.74%
FT <sub>t-1</sub> & no resident children < 18	-5.67%	23.41%***	-17.73%
PT <sub>t-1</sub> & age of youngest 6-11	1.10%	-0.15%	-0.95%
PT <sub>t-1</sub> & age of youngest 12-15	-6.42%	9.14%	-2.73%
PT <sub>t-1</sub> & age of youngest 16-17	-8.75%	16.98%	-8.23%
PT <sub>t-1</sub> & no resident children < 18	-7.81%	12.57%	-4.75%
FT <sub>1</sub>	10.75%***	-2.25%**	-8.50%
PT <sub>1</sub>	4.09%***	5.44%***	-9.53%
Mean 'long-term health condition'	-0.51%***	-0.92%***	1.42%
Mean 'no. of resident children < 18'	1.27%	0.60%	-1.87%
Mean 'live in major city'	-0.63%***	-0.76%***	1.38%
Mean 'h/hold income'	-0.88%**	0.03%	0.85%
Mean 'partnered'	-0.32%	0.56%	-0.24%
Mean 'partnered x no. of resident children < 18'	3.46%	-1.87%	-1.59%

Note: \*\*\*, \*\* and \* denote significance of the underlying coefficient estimate at the 1%, 5% and 10% levels, respectively. Sample size: 4205; Log-likelihood: -2574.968.

Table A3a: Dynamic random effects multinomial logit model of labour force status – Distinguishing yet-to-be mothers from mothers with no resident children – With uncorrelated random effects (uncorrelated across choices) – Additional mean marginal effects estimates

	Full time	Part time	Not employed
Age- 25-34	1.16%	0.13%	-1.29%
Age- 35-44	-2.97%	2.20%	0.77%
Age- 45 and above	-6.16%***	-1.97%*	8.13%
ESB immigrant	-2.33%**	-1.44%	3.77%
NESB immigrant or indigenous	0.04%*	-5.01%***	4.98%
Live in major city	8.10%***	5.23%***	-13.32%
Long term health condition	-8.59%***	3.32%	5.27%
Education - Year 11-12	-0.68%	1.14%	-0.46%
Education - Certificate or diploma	4.84%***	-1.13%	-3.71%
Education - Degree and above	7.58%***	1.19%***	-8.77%
Years of work experience	0.65%***	0.69%***	-1.34%
Years of work experience <sup>2</sup> /10	-0.91%***	-1.38%***	2.29%
H/hold income (excl. own labour and welfare income)	0.13%	0.40%	-0.53%
No housing costs (own outright or rent free)	-1.36%	-0.38%	1.74%
Disability in household	1.07%	-2.06%	0.98%
No. of resident children < 18	-3.14%***	0.34%	2.80%
Age of youngest resident child 6-11	-2.89%	10.41%***	-7.52%
Age of youngest resident child 12-17	13.90%***	-2.94%**	-10.96%
No resident children < 18	13.91%***	-5.53%	-8.38%
Not yet had children	13.59%***	6.20%***	-19.80%
Partnered	-2.34%	-1.10%	3.44%
Partnered x no. of resident children < 18	1.29%	0.37%	-1.66%
Partnered x age of youngest resident child 6-11	3.10%	-8.44%**	5.35%
Partnered x age of youngest resident child 12-17	-2.71%	-2.79%	5.50%
Partnered x no resident children < 18	3.65%	-6.70%	3.05%
Partnered x not yet had children	12.48%	-16.07%*	3.60%
Year	0.01%	-0.24%	0.23%
Year>=2006	1.09%	1.81%	-2.90%
Lone parent x Year>=2006	1.88%	-1.49%	-0.40%
FT <sub>t-1</sub>	41.14%***	-25.91%	-15.23%
PT <sub>t-1</sub>	3.93%***	28.41%***	-32.33%
FT <sub>t-1</sub> x no. of resident children < 18	0.33%**	5.56%***	-5.90%
PT <sub>t-1</sub> x no. of resident children < 18	0.92%	-1.97%	1.05%
FT <sub>t-1</sub> & age of youngest 6-11	8.71%**	-1.09%	-7.62%
FT <sub>t-1</sub> & age of youngest 12-17	-2.64%	9.72%	-7.08%
FT <sub>t-1</sub> & no resident children < 18	-3.64%**	24.42%***	-20.78%
FT <sub>t-1</sub> & have not yet had a child	-17.77%*	26.39%	-8.62%
PT <sub>t-1</sub> & age of youngest 6-11	1.32%	-0.02%	-1.30%
PT <sub>t-1</sub> & age of youngest 12-17	-6.92%	10.85%*	-3.93%
PT <sub>t-1</sub> & no resident children < 18	-9.09%	19.15%***	-10.07%
PT <sub>t-1</sub> & have not yet had a child	-6.55%	-4.08%	10.63%
FT <sub>1</sub>	9.89%***	-2.57%*	-7.32%
PT <sub>1</sub>	3.42%***	5.33%***	-8.74%
Mean 'long-term health condition'	-0.49%***	-0.84%***	1.32%
Mean 'no. of resident children < 18'	0.99%	0.66%	-1.66%
Mean 'live in major city'	-0.56%***	-0.74%***	1.30%
Mean 'h/hold income'	-0.79%**	-0.02%	0.81%
Mean 'partnered'	-0.32%	0.54%	-0.23%
Mean 'partnered x no. of resident children < 18'	3.47%*	-1.82%	-1.65%

Note: \*\*\*, \*\* and \* denote significance of the underlying coefficient estimate at the 1%, 5% and 10% levels, respectively. Sample size: 4205; Log-likelihood: -2566.407.

Table A3b: Dynamic random effects multinomial logit model of labour force status – Distinguishing yet-to-be mothers from mothers with no resident children – With correlated random effects (correlated across choices) – Additional mean marginal effects estimates

	Full time	Part time	Not employed
Age- 25-34	1.20%	0.21%	-1.41%
Age- 35-44	-2.95%	2.31%	0.64%
Age- 45 and above	-6.18%**	-1.94%*	8.11%
ESB immigrant	-2.39%*	-1.62%	4.01%
NESB immigrant or indigenous	-0.07%	-5.01%***	5.08%
Live in major city	8.25%***	5.47%***	-13.72%
Long term health condition	-8.61%***	3.25%	5.36%
Education - Year 11-12	-0.57%	1.04%	-0.47%
Education - Certificate or diploma	4.99%***	-1.04%	-3.95%
Education - Degree and above	7.70%***	1.26%***	-8.95%
Years of work experience	0.66%***	0.71%***	-1.37%
Years of work experience <sup>2</sup> /10	-0.91%***	-1.40%***	2.31%
H/hold income (excl. own labour and welfare income)	0.14%	0.40%	-0.53%
No housing costs (own outright or rent free)	-1.46%	-0.50%	1.96%
Disability in household	1.09%	-2.03%	0.94%
No. of resident children < 18	-3.16%***	0.31%	2.84%
Age of youngest resident child 6-11	-2.75%	10.43%***	-7.68%
Age of youngest resident child 12-17	14.03%***	-3.04%**	-10.99%
No resident children < 18	14.10%***	-5.64%	-8.46%
Not yet had children	14.21%***	6.18%***	-20.39%
Partnered	-2.34%	-1.09%	3.43%
Partnered x no. of resident children < 18	1.27%	0.38%	-1.64%
Partnered x age of youngest resident child 6-11	3.15%	-8.35%**	5.20%
Partnered x age of youngest resident child 12-17	-2.73%	-2.70%	5.43%
Partnered x no resident children < 18	3.71%	-6.67%	2.96%
Partnered x not yet had children	12.45%	-15.77%	3.32%
Year	-0.02%	-0.17%	0.19%
Year>=2006	1.20%	1.78%	-2.98%
Lone parent x Year>=2006	1.87%	-1.52%	-0.35%
FT <sub>t-1</sub>	40.27%***	-26.62%	-13.65%
PT <sub>t-1</sub>	3.31%***	27.77%***	-31.08%
FT <sub>t-1</sub> x no. of resident children < 18	0.32%*	5.48%***	-5.80%
PT <sub>t-1</sub> x no. of resident children < 18	0.92%	-2.00%	1.08%
FT <sub>t-1</sub> & age of youngest 6-11	8.55%**	-0.96%	-7.59%
FT <sub>t-1</sub> & age of youngest 12-17	-2.61%	10.06%	-7.45%
FT <sub>t-1</sub> & no resident children < 18	-3.62%*	24.36%***	-20.74%
FT <sub>t-1</sub> & have not yet had a child	-18.01%	26.50%	-8.49%
PT <sub>t-1</sub> & age of youngest 6-11	1.18%	-0.12%	-1.06%
PT <sub>t-1</sub> & age of youngest 12-17	-6.86%	10.86%	-3.99%
PT <sub>t-1</sub> & no resident children < 18	-9.13%	18.88%**	-9.76%
PT <sub>t-1</sub> & have not yet had a child	-6.84%	-4.34%	11.18%
FT <sub>1</sub>	10.33%***	-1.98%**	-8.35%
PT <sub>1</sub>	3.84%***	5.72%***	-9.56%
Mean 'long-term health condition'	-0.50%***	-0.87%***	1.37%
Mean 'no. of resident children < 18'	1.00%	0.61%	-1.61%
Mean 'live in major city'	-0.58%***	-0.76%***	1.34%
Mean 'h/hold income'	-0.80%**	-0.05%	0.85%
Mean 'partnered'	-0.31%	0.53%	-0.22%
Mean 'partnered x no. of resident children < 18'	3.53%*	-1.71%	-1.83%

Note: \*\*\*, \*\* and \* denote significance of the underlying coefficient estimate at the 1%, 5% and 10% levels, respectively. Sample size: 4205; Log-likelihood: -2565.477.

## References

- Australian Bureau of Statistics (ABS) (2009) *Labour Force, Australia, October 2009, Time Series Spreadsheets*, Catalogue No. 6202.0, Table 2.
- Akay, A. (2009) "The Wooldridge Method for the Initial Values Problem is Simple: What About Performance?" IZA Discussion Paper No. 3943.
- Andren, T. (2003) "The Choice of Paid Child care, Welfare, and Labor Supply of Single Mothers," *Labour Economics*, 10(2): 133-47.
- Arulampalam, W. and Stewart, M. (2008) "Simplified Implementation of the Heckman Estimator of the Dynamic Probit Model and a Comparison with Alternative Estimators," Warwick Economic Research Papers, No. 884, University of Warwick.
- Barnes, M., Lyon, N., Morris, S., Robinson, V. and Yau, Y. (2005) "Family Life in Britain: Findings from the 2003 Families and Children Study (FACS)," Department for Work and Pensions (UK) Research Report No. 250.
- Barrett, G. (2002) "The Dynamics of Participation in the Sole Parent Pension," *The Economic Record*, 78(240).
- Barrett, G. and Cobb-Clark, D. (2001) "The Labour Market Plans of Parenting Payment Recipients: Information from a Randomised Social Experiment," *Australian Journal of Labour Economics*, 4(3), 192-223.
- Baxter, J. (2005a) "Women's Work Transitions Around Childbearing," Negotiating the Life Course Discussion Paper Series, DP-021.
- Baxter, J. (2005b) "Mothers' Employment Transitions Following Childbirth," *Family Matters*, No. 71, Winter 2005.
- Bell, K., Brewer, M. and Phillips, D. (2007) *Lone Parents and 'Mini-Jobs'*, Institute of Fiscal Studies, London.
- Bingley, P. and Walker, I. (1997) 'The Labour Supply, Unemployment and Participation of Lone Mothers in In-Work Transfer Programmes,' *Economic Journal* 107(444), 1375-1390.
- Bingley, P., Lanot, G., Symons, E. and Walker, I. (1995) 'Child Support Reform and the Labor Supply of Lone Mothers in the United Kingdom,' *Journal of Human Resources* 30(2), 256-279.

- Blank, R. M. (1998) "Labor Market Dynamic and Part-Time Work," *Research in Labor Economics*, 17: 57-93.
- Blundell, R., Brewer, M. and Francesconi, M. (2005) "Job changes, hours changes and the path of labour supply adjustment," IFS Working Papers: W05/21.
- Buddelmeyer, H., Mourre, G. and Ward, M. (2005) "Part-Time Work in EU Countries: Labour Market Mobility, Entry and Exit," *IZA Discussion Paper*, No. 1550.
- Cai, L., Kalb, G., Tseng, Y. and Vu, H. (2005) "The Effect of Financial Incentives on Being in Paid Work: Evidence for Sole parents from Microsimulation and Quasi-Experimental Evaluation," Melbourne Institute Working Paper, No. 10/05.
- Chamberlain, G. (1980) "Analysis of covariance with qualitative data," *The Review of Economics Studies*, 47(1): 225-238.
- Connelly, R. and Kimmel, J. (2003) "Marital Status and Full-Time/Part-Time Work Status in Child Care Choices," *Applied Economics*, 35(7): 761-77
- Del Boca, D. and Locatelli, M. (2006) 'The Determinants of Motherhood and Work Status: A Survey,' *IZA Discussion Paper*, No. 2414.
- Doiron, D. (2004) "Welfare Reform and the Labour Supply of Lone Parents in Australia: A Natural Experiment Approach," *The Economic Record*, 80(249), 157-76.
- D. Doiron and G. Kalb (2002), "Demand for Childcare Services and Labour Supply in Australian Families", *The Australian Economic Review*, 35(2), 204-213.
- Doiron, D. and Kalb, G. (2005a), "Demands for Childcare and Household Labour Supply in Australia", *Economic Record* , 81(254), 215-236.
- D. Doiron and G. Kalb (2005b), "Effects of Child Care Demands and Policies on household Labour Supply in Australia", Policy Research Paper no. 25, the Commonwealth Department of Family and Community Services.
- Eissa, N., Kleven, H. J. and Kreiner, C. T. (2007) "Evaluation of Four Tax Reforms in the United States: Labor Supply and Welfare Effects for Single Mothers," *Journal of Public Economics*, 92: 795-816.
- Francesconi, M. and van der Klaauw, W. (2007) "The Socioeconomic Consequences of 'In-Work' Benefit Reform for British Lone Mothers," *Journal of Human Resources*, 42(1): 1-31.



- Gong, X., van Soest, A., and Villagomez, E. (2004) "Mobility in the urban labor market: a panel data analysis for Mexico," *Economic Development and Cultural Change*, 53(1): 1-36.
- Gonzalez, L. (2004) "Single Mothers and Work," *Socio-Economic Review*, Special Issue 2004, 2(2): 285-313.
- Gray, M., Qu, L., de Vaus, D. and Millward, C. (2002) "Determinants of Australian mothers' employment," *Australian Institute of Family Studies*, Research Paper No. 26.
- Gray, M., Qu, L., Renda, J. and de Vaus, D. (2003) "Changes in the labour force status of lone and couple Australian mothers, 1983-2002," Australian Institute of Family Studies, Research Paper No. 33.
- Gregory, R., Klug, E. and Thapa, P. (2003) "Lone Mothers Work and Welfare: An Assessment of the July 2000 Tax and Welfare Reform," Report prepared for FaCS.
- Hales, J., Tipping, S. and Lyon, N. (2007) "Mothers' participation in paid work: the role of 'mini-jobs'," Department for Work and Pensions (UK) Research Report No. 467.
- Han, W. and Waldfogel, J. (2001) "Child Care Costs and Women's Employment: A Comparison of Single and Married Mothers with Pre-School-Aged Children," *Social Science Quarterly*, 82(3): 552-68.
- Iacovou, M. and Berthoud, R. (2001) "Parents and Employment: An Analysis of Low Income Families in the British Household Panel Survey," Department of Social Security (UK) Research Report No. 107.
- Jenkins, S. and Symons, E. (2001) "Child Care Costs and Lone Mothers' Employment Rates: UK Evidence," *The Manchester School* 69(2), pp.121-147.
- Kalb, G. and Lee, W.-S. (2008) Childcare Use and Parents' Labour Supply in Australia, forthcoming in *Australian Economic Papers*.
- Kalb, G. and Lee, W.-S. (2007) "The Effect of an Alternative Childcare Subsidy on Labour Supply: A Policy Simulation", *Australian Journal of Labour Economics* 10(1), pp. 39-57.
- Kasparova, D., Marsh, A., Vegeris, S. and Perry, J. (2003) "Families and children 2001: Work and childcare," Department for Work and Pensions (UK) Research Report No. 191.
- Meyer, B. and Rosenbaum, D. (2001) "Welfare, The Earned Income Tax Credit, and the Labor Supply of Single Mothers," *Quarterly Journal of Economics*, 116(3): 1063-1114.

- Mundlak, Y. (1978) "On the pooling of time series and cross section data," *Econometrica*, 46(1): 69-85.
- Paull, G. (2007) 'Partnership transitions and mothers' employment,' *Department for Work and Pensions*, Research Report No. 452.
- Rammohan, A. and Whelan, S. (2005), "Child Care and Female Employment Decisions", *Australian Journal of Labour Economics*, 8(2), 203-225.
- Tekin, E. (2007) "Child care Subsidies, Wages, and Employment of Single Mothers," *Journal of Human Resources*, 42(2): 453-87.
- Ware, J., Snow, K., Kosinski, M. and Gandek, B. (2000) *SF-36 Health Survey: Manual and Interpretation Guide*, QualityMetric Inc., Lincoln, RI.
- Wolfe B. L. and Hill, S. C. (1995) "The Effect of Health on the Work Effort of Single Mothers," *Journal of Human Resources*, 30(1): 42-62.
- Wooldridge, J. M. (2005) "Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity," *Journal of Applied Econometrics*, 20: 39-54.