

The dynamics of welfare participation among women who experienced teenage motherhood in Australia*

Sung-Hee Jeon, Guyonne Kalb and Ha Vu
*Melbourne Institute of Applied Economic and Social Research,
The University of Melbourne*

November 2008

Abstract

This study examines whether the factors that determine the welfare participation of women who experienced teenage motherhood differ from the factors that determine the welfare participation of women who had their first child at an older age. We examine these factors across the lifetimes of both groups of women. A dynamic random effects probit model is applied to investigate the extent of state dependence in welfare participation while allowing for observed and unobserved individual heterogeneity. We find evidence of state dependence for all women, but it is stronger for women who experienced teenage childbearing than for women who had a child at an older age. In addition, poor health is an important factor in increasing the probability of the welfare participation of women who experienced teenage childbearing.

JEL classifications: I39; J13

Keywords: teenage motherhood; welfare participation; state dependence

Acknowledgments

This paper is based on research commissioned by the Australian government Department of Education, Employment and Workplace Relations (DEEWR) under the Social Policy Research Services Agreement (2005–09) with the Melbourne Institute of Applied Economic and Social Research. The paper uses the confidentialised unit record file from the Department of Families, Housing, Community Services and Indigenous Affairs' (FaHCSIA's) Household, Income and Labour Dynamics in Australia (HILDA) survey managed by the Melbourne Institute of Applied Economic and Social Research. The views expressed in this paper are those of the authors, and do not represent the views of DEEWR, FaHCSIA or the Commonwealth Government.

* *Correspondence:* Sung-Hee Jeon, Melbourne Institute of Applied Economic and Social Research, The University of Melbourne, VIC 3010 Australia, Tel: +61 (3) 8344 2191, Fax: +61 (3) 8344 2111, Email: shjeon@unimelb.edu.au

1. Introduction

This study investigates the dynamics of welfare participation at different stages in the life cycle of Australian women who had a first child as teenagers (hereafter “teenage mothers”). We compare their welfare participation dynamics with those of women who had their first child at an older age (hereafter “older mothers”). Women who experienced teenage motherhood generally have poor socio-economic outcomes over their lifetime; their high welfare dependency is undisputed, although there is ongoing debate regarding the causal effect of teenage motherhood in contributing to those poorer outcomes.¹ In this study, we focus on examining the dynamics of welfare participation of women who experienced teenage motherhood, since it captures poverty and low income (and their persistence) better than labour market outcomes alone could do. A relatively large proportion of welfare recipients combine receipt of welfare payments with employment. From 2001 to 2005, on average 29.3 per cent of welfare recipients in Australia were employed part-time or full-time.

Australia’s teenage fertility rate of 16.3 babies per 1000 teenage women is low in comparison to countries such as the United States (51.1) and the United Kingdom (29.7) (Morehead and Soriano, 2005). Teenage mothers make up only one per cent of all single mothers in Australia. However, they are of concern in relation to income support policies, since they are overrepresented as recipients of the main income support payment for single mothers (Morehead and Soriano, 2005). Around one third of

¹ Earlier studies, controlling for observed individual characteristics, found that early motherhood has a negative effect on educational achievement and later labour market outcomes. In the last decade, researchers have used a variety of innovative methods to control for unobserved individual heterogeneity, which may affect selection into teenage motherhood (Goodman, Kaplan and Walker, 2004; Hotz, McElroy and Sanders, 2005; Ermisch and Pevalin, 2003 and 2005; Bradbury 2006; Fletcher and Wolfe 2008). These newer approaches generated a debate in the literature as to whether any negative effects caused by early childbearing remain, once individual unobserved characteristics have been controlled for. Recent studies in Australia, the UK and the US provide evidence that the negative effects of teenage motherhood on education and labour market outcomes may be much less than those conventionally estimated. However, early in the debate, Hoffman, Foster and Furstenberg (1993) note that even though the effects are substantially smaller than conventional estimates, the effects of early childbearing are still negative and significant, even after controlling for unobservable characteristics. Drawing any robust quantitative conclusions from this debate is difficult due to the sensitivity of the results to the empirical methodology chosen and the data set used. The data we use do not have the required instrumental variables such as miscarriages or (twin) siblings to control for the endogeneity of selection into teenage motherhood to allow measurement of a direct, causal effect of teenage childbearing on welfare participation.

Parenting Payment² single recipients with a youngest child less than six years old had their first child before age 20. In the availability of income support to all households without income, or on low income independent of the presence of children, Australia is similar to the UK and different from the US.

A number of UK and US studies on the effect of teenage motherhood on labour market outcomes have also examined the effect on welfare receipt.³ Possible reasons for high welfare participation rates, identified in those studies, include low human capital (early school leaving appears to be associated with teenage motherhood) and lower probabilities of having a partner, or if having a partner, it is more likely to be someone with low human capital as well (Goodman, Kaplan and Walker, 2004). Health also seems to play a role in low socio-economic status outcomes and subsequent welfare participation (Liao, 2003). Most of these studies limit the analysis to welfare participation in the short term (the latest effects in the literature are usually measured around age 30) and mostly conduct analysis using cross-sectional approaches (at one time point).

This study extends the literature by examining whether the factors that determine the welfare participation of teenage mothers differ from the factors that determine the welfare participation of older mothers across the women's life cycles (between 20 and 62 years of age). In particular, this paper investigates the extent of state dependence in the welfare participation of mothers. We use longitudinal data for a period of up to five years from the Household, Income and Labour Dynamics in Australia (HILDA) survey.

One way of understanding the factors that influence welfare dependency over time is to consider whether a higher rate of welfare participation can be attributed to state dependence. Individuals who have received welfare payments in the past are often observed to be more likely to receive them in the future. One explanation is that as a consequence of receiving welfare, preferences or constraints relevant to future choices are altered (that is, there is state dependence). A second explanation is that individuals

² Parenting Payment is one of the income support (welfare) payments in Australia. Until 2006 it was paid to the primary carer of children in low-income households until their youngest child turned 16. Now eligibility stops when the youngest child turns six for a partnered parent or eight for a single parent.

³ See for example, Fletcher and Wolfe (2008), Goodman, Kaplan and Walker (2004), or Hotz, McElroy and Sanders (2005). Although these studies examine welfare participation, they mainly focus on the effect of teenage motherhood on labour market outcomes rather than on welfare participation.

may differ in certain unmeasured characteristics (that is, unobserved individual heterogeneity persisting over time), which influence the probability of welfare receipt. In the first case, welfare receipt has a treatment effect in the sense that an otherwise identical individual who has not received welfare will behave (or be treated) in a different way in the future compared to an individual who has received welfare. In the second case however, previous welfare receipt only appears to be a determinant of future receipt because it is a proxy for temporally persistent, unobservable factors that determine choices.

Distinguishing state dependence from other sources of welfare dependence is important from a policy perspective. If the relationship between past and current participation in a welfare program is mostly due to state dependence, early intervention policies preventing people from entering welfare or assisting people early in the welfare receipt spell may be relatively effective in reducing future utilisation of welfare benefits. However, if the relationship between past and current participation in a welfare program is instead due to persistent individual unobserved heterogeneity, the timing of the intervention may be less important, and a different type of policy may be required to address the unobserved causes of the persistence. Therefore, knowledge on the extent of state dependence is critical for the design of effective policies to assist welfare recipients to exit welfare programs.

A dynamic random effects probit model is applied to estimate state dependence and to assess the effects of a range of observed individual and household characteristics, while taking into account unobserved individual heterogeneity. We estimate a dynamic model of welfare participation separately for teenage mothers and for older mothers. We find evidence that state dependence in welfare participation is present in both groups of mothers, but that it is more important for teenage mothers than for older mothers. In addition, poor health is associated with an increase in the probability of a teenage mother's welfare participation.

The paper proceeds as follows. Section 2 explains the identification of teenage motherhood, describes the data, and presents summary statistics. Section 3 describes the methodology used and Section 4 reports the estimation results. A concluding discussion is in Section 5.

2. Data

2.1 Identification of teenage mothers

We use the first five waves (years 2001 to 2005) of the Household, Income and Labour Dynamics in Australia (HILDA) survey, which is a representative sample from the general Australian population. HILDA contains information on the age of respondents and the ages of any children they have had, independent of whether these children are currently residing in the same household. This information enables us to identify all female respondents who once experienced teenage childbearing, no matter how long ago this occurred. In addition, for each wave the data contain information on whether women are in or out of income support so that we can study the dynamics of welfare participation for these women.

We identify women who gave birth for the first time between the ages of 15 and 19 by subtracting the age of their oldest child from their own age. Women whom we find to have had their first child at age 14 or younger are excluded from our analysis. The data do not allow us to separate the women's own birth children from their adopted children (step or foster children can be distinguished from their own birth children). Although this potential measurement error is likely to be trivial, we minimise it by excluding women who have age differences between them and their first child of less than 15 years.⁴ In addition, women currently aged over 62 are excluded from the sample, since they were eligible for the Age Pension at the time of the survey. Over the five waves of HILDA, 839 women currently aged 15 to 62 are identified as teenage mothers, and the average current age of these women is 42.⁵ Older mothers are defined as women who had their first child at age 20 or over. The number of older mothers currently aged 20 to 62 in our sample is 4004, and the average current age of these women is 44.

In each wave, we classify mothers as welfare participants if they reported a payment from any of the government pensions or allowances.⁶ Table 1 shows welfare

⁴ Twenty seven women were calculated to have become a mother between 2 and 14 years of age.

⁵ Of this group, 684 women are first observed in wave 1, 41 women in wave 2, 43 women in wave 3, 36 women in wave 4, and 35 women in wave 5. At the time of the first observation, 52 women are aged between 15 and 19, 159 women between 20 and 29, 173 women between 30 and 39, 204 women between 40 and 49, 218 women between 50 and 59, and 33 women between 60 and 62.

⁶ This includes all types of income support, for example unemployment-related or illness-related, but excludes the Family Tax Benefit payments related to the age and number of children, which are also paid

participation rates of teenage mothers by age group. On average over the five waves of HILDA, 45.2 per cent of teenage mothers are income support recipients. The women are grouped into six age categories based on their current age in each wave. The welfare participation of women who became mothers at an older age is clearly much lower at 21.7 per cent. The patterns of welfare participation across age groups are similar for the two groups of mothers. The highest participation rate is found for mothers younger than 30 years and the lowest participation rate is found for mothers aged between 40 and 49 years old.

Table 1. Welfare participation rates of teenage mothers and of older mothers by current age

Age group	<i>Teenage mothers</i>		<i>Older mothers</i>	
	Rate of welfare participation	Std. Err	Rate of welfare participation	Std. Err
15-19	.588	.042		
20-29	.662	.022	.357	.014
30-39	.410	.020	.217	.006
40-49	.349	.017	.178	.005
50-59	.437	.016	.213	.007
60-62	.497	.039	.273	.015
Total	.452	.009	.217	.003

Note: The statistics are from pooled data in which the total number of observations on teenage mothers is 3077 and on older mothers is 15342.

2.2. Demographic and labour market characteristics

The demographic and labour market characteristics of teenage mothers are shown in Appendix Tables 1 and 2. Characteristics of Australian teenage mothers are similar to those of teenage mothers in other countries. Women who start motherhood as teenagers have slightly more children on average than older mothers have. A smaller proportion of them is legally married and a larger proportion of them has never been married when compared to older mothers. At the time of the first birth, fewer teenage mothers were married, and more teenage mothers were still living at their parents' home. On all fronts, teenage mothers are likely to have lived in less favourable circumstances throughout their lives compared to older mothers. In particular, a larger proportion of teenage mothers lived in a single-parent household (mostly single-mother households) when growing up; both parents were less likely to be employed when the teenage mothers were 14 years old. Finally, compared to older mothers, a larger proportion of (former)

to households on middle to higher incomes. For both groups of mothers, the Parenting Payment is the most likely type of welfare payment and the next most likely payment is the Disability Support Pension.

teenage mothers report low current life satisfaction indicating that overall they appear to be less satisfied with their circumstances than older mothers are.

Regarding labour market characteristics, teenage mothers have less favourable labour market outcomes than older mothers in all respects. Teenage mothers have spent less time in paid work, and more time out of the labour force, as proportions of total time since leaving full-time education than older mothers have. Their current labour force participation is also lower. They are more likely to be unemployed or not in the labour force, and are less likely to work compared to older mothers. However when they have jobs, they work on average more hours than the older mothers do. In addition to their own low labour market participation, their spouses' labour market participation rates are also lower than the participation rates of older mothers' spouses. Over 26 per cent of spouses of teenage mothers are currently not in the labour force, whereas the rate for spouses of older mothers is just over 12 per cent. As a consequence of the lower labour market participation (and perhaps the lower educational attainment) of both teenage mothers and their partners, the average incomes of both teenage mothers and their spouses are lower than for older mothers.

2.3. School leaving

One of the primary concerns with teenage motherhood is its potential adverse effect on school education, such as dropping out of school because of childbearing or a lack of childcare. Appendix Table 1 shows that teenage mothers' educational attainment is indeed lower than that of older mothers. To investigate this further, Table 2 presents a cross-tabulation of the women's ages at which they became teenage mothers and the ages at which they left school. Typically women who had a teenage birth left school before becoming a mother, with the most common school-leaving age being 15. Most of the women who became mothers at age 18 or 19 left school at age 15 or 16. This school-leaving age may reflect the minimum legal school-leaving age in Australia.⁷ Overall, only 165 women of the 839 teenage mothers left school at the age of becoming a mother or a year before the event. That is, the majority of women left school before they were pregnant. Very few women (only 16) continued school beyond the age at

⁷ The legal school-leaving age differs state by state but currently is around 16 in most states in Australia. For example, in Western Australia the school-leaving age will change in 2008. It will be at the end of the year when turning 17 years of age (it was 16). In South Australia the age of compulsory education changed from 15 to 16 years from 1 January 2003.

which they became a mother. Table 2 also shows the age of leaving school for older mothers. Clearly, older mothers are much more likely to stay at school until an older age, and therefore they are more likely to finish at least Year 12 (high school).

Table 2. Age of leaving school for the two groups of mothers

Age left school	<i>Teenage mothers</i> <i>Age became a teenage mother</i>					<i>Teenage mothers</i> total	<i>Older mothers</i> total
	15	16	17	18	19		
Never went	0	0	2	0	0	2	4
Still at school	0	0	1	0	0	1	0
9-11	2	1	1	2	6	12	22
12-14	2	22	28	44	54	150	271
15	13	33	66	91	104	307	796
16	5	16	34	66	113	234	988
17	0	2	7	35	55	99	1157
18	1	0	6	6	17	30	665
19	0	0	1	0	2	3	74
20-23	0	0	0	0	1	1	22
missing						0	5
total	23	74	146	244	352	839	4004

Note: the numbers of older mothers are based on the last observed wave.

We consider whether the pattern shown in Table 2 might be dominated by the teenage mothers of an older generation, thus reflecting the life cycle of this older generation in which many women had low educational attainment, married early, and therefore became mothers at a younger age than is common now. Hence, we also examine separately the corresponding statistics of Table 2 for women who are currently younger than 30 years. The statistics for this younger cohort show similar patterns to Table 2.⁸ The evidence from our data indicates that teenage motherhood does not cause early school leaving directly, since by the time the teenager becomes a mother, she has in most cases already left school. There may be (unobservable) factors that contribute to both teenage motherhood and early school leaving.

2.4. Health

Considering current health conditions, teenage mothers are more likely to have poor health outcomes in a number of dimensions. Details of the current mental and physical health conditions of teenage mothers are shown in Appendix Table 3. The general self-reported health status of teenage mothers is poorer than for older mothers. The

⁸ The only difference between these generations is that there is an increase in the proportion of teenage mothers who finish Year 12, which is in line with the increase in the age of compulsory schooling over time (see Jeon, Kalb and Vu, 2008). However, the increase in education for older mothers has been much more substantial over time.

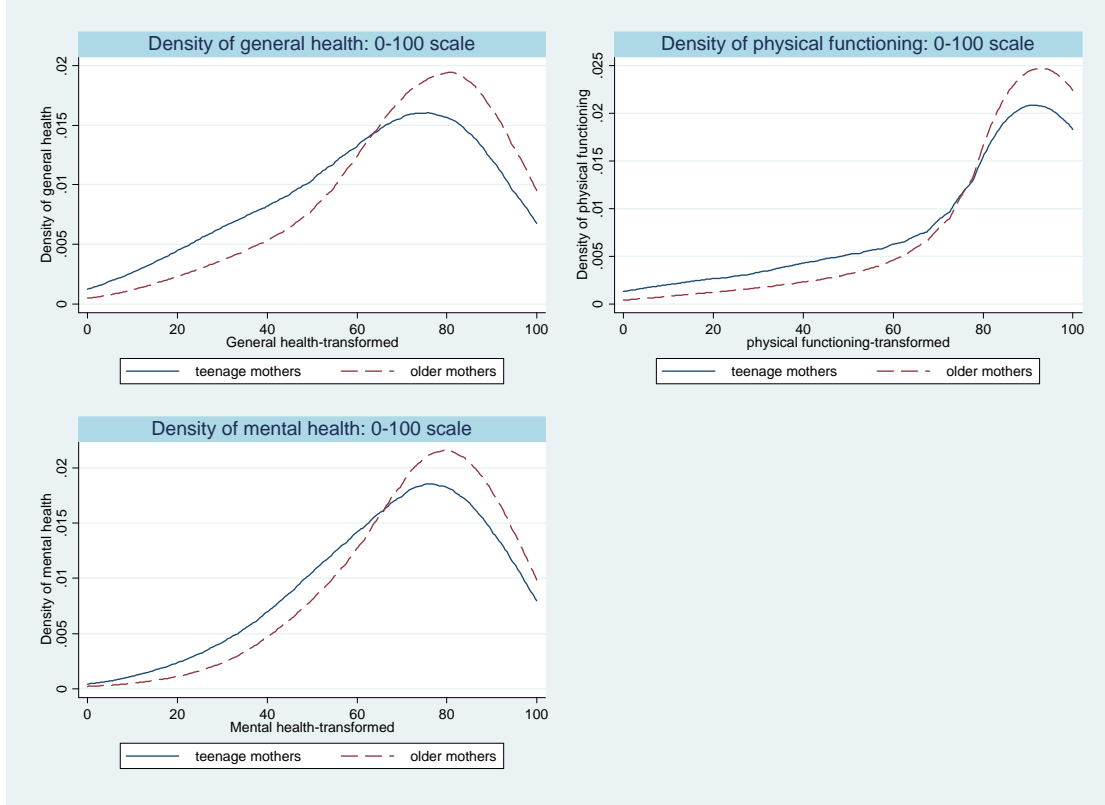
proportion who report poor or fair health is nearly twice as high for teenage mothers, whereas the proportion reporting excellent or very good health is about 1.5 times higher for older mothers. Teenage mothers are also more likely to have (multiple) long-term conditions or to have been affected in their work or other activities for physical or emotional reasons. Their mental health is also poorer than for older mothers. The proportion of mothers on the Disability Support Pension is also much higher among teenage mothers (10.46 per cent) than among older mothers (3.31 per cent).⁹

For the two groups of mothers, three different measures of health are shown in Figure 1: general health, physical functioning, and mental health. The measures are on a 0 to 100 scale, with zero being the worst health outcome and 100 being the best. The graphs clearly show that on all three measures, teenage mothers have a higher probability of being at the low end of the score than older mothers do.

Interestingly, a recent Australian study using samples of Australian twins and their relatives finds a causal effect of teenage childbearing on smoking, drinking and body size (Webbink, Martin and Visscher, 2008). The authors conclude that teenage childbearing seems to induce negative health behaviour. While we cannot re-examine their findings using HILDA, our data clearly show that teenage mothers have poorer outcomes in all dimensions of health than older mothers do which is consistent with their conclusion.

⁹ Although there is a clear link between receipt of the Disability Support Pension and long-term health conditions, the relationship is far from being one-to-one. Among teenage mothers who report long-term health conditions, 29.64 per cent are current Disability Support Pension recipients. This indicates that the presence of a self-reported long-term health condition in most cases does not lead to Disability Support Pension receipt (although they may be receiving another income support payment such as the Parenting Payment). However, the majority of mothers who receive a Disability Support Pension report having a long-term health condition.

Figure 1. Distribution of health measures for teenage mothers and older mothers



Note: The 0-100 health scales, derived from the HILDA survey’s health-related questions, are used to produce these graphs.

3. Model and Estimation Approach

As discussed earlier, current welfare participation may be determined by state dependence, and observed and unobserved individual factors. To investigate the presence of state dependence, which is defined as the extent to which participation in welfare in the previous year increases the probability of participation in welfare in the current year, while controlling for differences in observed and unobserved characteristics between individuals (that is, observed and unobserved heterogeneity), we estimate a dynamic probit model with random effects.

Consider a model for welfare participation by mother i at time t (wfp_{it}), with wfp_{it}^* the underlying latent variable for the mother’s observed welfare participation (wfp_{it}). Then, we can specify a model as follows:

$$wfp_{it}^* = \gamma wfp_{it-1}^* + \beta' X_{it} + \alpha_i + u_{it} \quad (1)$$

$$wfp_{it} = \begin{cases} 1 & \text{if } wfp_{it}^* \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

where γ is the parameter representing state dependence; X_{it} is a vector of observed characteristics which may affect the mother's welfare participation (wfp_{it}); α_i is an individual-specific and time-invariant random component, assumed to be normally distributed, having zero mean and variance σ_α^2 ; and u_{it} is a time- and individual-specific disturbance, assumed to be a serially independently distributed standard normal, which is uncorrelated with X_{it} and α_i . In addition, although the random effects model assumes α_i to be uncorrelated with X_{it} , we also add regressors \bar{x}_i , which are the individual averages of the independent variables over the sample period, to control for potential correlation between the individual-specific effects (α_i) and regressors (X_{it}) of the model (Chamberlain 1980; Mundlak, 1978).

Since the total error term ($v_{it} = \alpha_i + u_{it}$) of the model is correlated over time due to the individual-specific time-invariant α_i component, we have:

$$\rho = Corr(v_{it}, v_{is}) = \frac{\sigma_\alpha^2}{\sigma_\alpha^2 + \sigma_u^2} \quad t, s = 2, \dots, T \quad \text{and} \quad t \neq s \quad (2)$$

where ρ measures the proportion of the total variance contributed by the individual-level (or panel-level) variance component. Based on this statistic, a likelihood ratio test for the presence of unobserved heterogeneity can be constructed ($H_0: \rho = 0$). If ρ is zero, the panel-level variance component is not important. That is, the panel estimator would not be different from the pooled estimator, where no account is taken of individual-specific unobserved differences.

Due to the presence of state dependence in the form of a lagged dependent variable (wfp_{it-1}), the problem of initial conditions arises. This is caused by our lack of knowledge of the data-generating process governing the initial welfare participation outcome. If the individual initial conditions are correlated with α_i , the estimator will be inconsistent and tend to overestimate γ (that is, overstate the extent of state dependence). Heckman (1981) therefore suggests that the initial welfare participation state (wfp_{i1}^*) is approximated by a reduced form equation:

$$wfp_{i1}^* = \pi' z_{i1} + \eta_i \quad (3)$$

where z_{i1} contains information from the first wave and η_i is the standard normal distribution and correlated with α_i , but uncorrelated with u_{it} for $t \geq 2$. Using an

orthogonal projection, the latter can be written as $\eta_i = \theta\alpha_i + u_{i1}$ ($\theta > 0$) with α_i and u_{i1} independent of one another. Consistent estimates are then obtainable by jointly estimating the equations for the probability of welfare participation for the initial state of the sample (3) and the latent dynamic welfare participation (1), using maximum likelihood. The significance of the parameter θ indicates whether the initial conditions are endogenous.¹⁰

The estimation results are presented in the next section. To compare the behaviour of mothers who experienced teenage motherhood with those of older mothers, we exclude all women among the teenage mothers who are currently less than 20 years old from the analysis.

4. Results

The estimates of the pooled probit and dynamic random effects probit are shown in Table 3. The definitions for variables used in the regressions are presented in Appendix Table 4. To make the estimates of the random effects probit comparable to those of the pooled probit, the coefficients are rescaled by multiplying the parameters by an estimate of $\sqrt{1 - \hat{\rho}}$, where $\hat{\rho} = \frac{\hat{\sigma}_\alpha^2}{\hat{\sigma}_\alpha^2 + \hat{\sigma}_u^2}$.¹¹ For easy interpretation and comparison of the results, average partial effects (APE) are computed by averaging individual marginal effects over the sample. These are presented in Table 4.

In general, a mother's welfare dependency may depend on having young children who require care. However, as her children grow up the mother may start looking for work and leave welfare. Therefore, a mother's current welfare participation is likely to depend on the age of the youngest child, but in addition state dependence may depend on having young children. Therefore, we estimate state dependence (γ) using interactions between the lagged welfare participation and the age of the youngest dependent child (measured in categories). As expected, Table 3 (columns (2) and (4))

¹⁰ We also estimated the models using Wooldridge's (2005) approach to deal with the initial condition problem. Since the two sets of results are quite similar only the results with Heckman's approach are presented. The estimates for the model with Wooldridge's approach are available on request from the authors.

¹¹ See Arulampalam (1999) for a detailed discussion.

shows that the probability of the mother's current welfare participation is negatively associated with the age of the youngest dependent child for both groups of mothers.

Table 3. Coefficients for pooled and dynamic random effects probit of welfare participation

Variable	<i>Teenage mothers</i>		<i>Older mothers</i>	
	(1) pooled coef.	(2) Heckman scaled coef.	(3) pooled coef.	(4) Heckman scaled coef.
wfp-1 * youngest 0-5	1.048***	0.337*	1.423**	0.201**
wfp-1 * youngest 6-15	1.700***	0.886***	1.882***	0.514***
wfp-1 * youngest 16+	2.019***	1.036**	2.195***	0.752***
wfp-1 * no child	2.045***	1.050***	2.373***	0.787***
age	-0.012	-0.019	-0.033*	-0.059**
age ²	0.029	0.043	0.043**	0.072***
Divorced/separated	0.779***	0.651***	1.640***	1.300***
Widowed	0.827	0.764*	0.728*	0.609**
Never married	0.691*	0.897***	1.481***	1.253***
Youngest child aged 6-15	-0.436**	-0.389**	-0.219***	-0.189***
Youngest child aged 16+	-1.044***	-0.838**	-0.705***	-0.646***
No dependent child	-0.736**	-0.599**	-0.673***	-0.623***
Number of children is 2	-0.218	-0.133	0.071	0.055
Number of children is 3+	0.217	0.122	0.125	0.093
bachelor degree or more other post school qual.	-0.415**	-0.537**	-0.332***	-0.520***
Year 12	0.079	0.050	-0.035	-0.062
Aboriginal	0.278*	0.326*	0.085	0.290*
Good health	-0.194	-0.173	0.044	0.001
Fair health	0.164	0.282*	0.184**	0.086
Poor health	-0.025	0.121	0.233	0.108
% time in employment	-0.039***	-0.031**	-0.032***	-0.023***
Married before 1 st birth	-0.077	-0.162	-0.136**	-0.239***
Born in a NESCS	-0.236	-0.160	0.073	0.088
constant	-0.647**	-0.275	-0.162**	1.004
Rho (ρ)		0.401***		0.624***
theta (θ)		1.503***		1.014***

Notes: *** significant at 1%; ** significant at 5%; * significant at 10%. Standard errors are available from the authors.

Significance in the Heckman estimator is based on the original coefficients, not on the rescaled coefficients. Additional covariates are the individual means of dependent variables over the sample period, missing dummies, and year dummies. The individual means are included for marital status, the number of dependent children, health status, and the proportion of years in paid work since leaving full-time education.

The older the youngest child, the less likely it is that the mother participates in welfare. However, the coefficients of the interactions between the lagged welfare participation and the age of the youngest dependent child increase with the age of the youngest child. All interactions are positive and statistically significant. The coefficient of the

interaction with having no dependent children is the largest among all interactions. The extent of state dependence in a mother's welfare participation does not decrease as young children grow up. In contrast, as her children grow up state dependence becomes more important in explaining a mother's current welfare participation. One possible explanation that comes to mind is that the reason for welfare participation may change when children grow older.

Table 4. Average Partial Effects from pooled and dynamic random effects probit

Variable	<i>Teenage mothers</i>		<i>Older mothers</i>	
	(1) pooled	(2) Heckman	(3) pooled	(4) Heckman
wfp-1 * youngest 0-5	23.26 ^{***}	8.68 [*]	31.76 ^{***}	4.12 ^{***}
wfp-1 * youngest 6-15	39.12 ^{***}	23.42 ^{***}	46.63 ^{***}	11.59 ^{***}
wfp-1 * youngest 16+	41.54 ^{***}	26.41 ^{**}	53.21 ^{***}	18.03 ^{***}
wfp-1 * no child	52.17 ^{***}	29.61 ^{***}	61.09 ^{***}	19.04 ^{***}
age	-0.13	-0.34	-1.18 [*]	-1.92 ^{***}
Divorced/separated	16.36 ^{***}	16.94 ^{***}	36.20 ^{***}	33.42 ^{***}
Widowed	16.79	19.45 [*]	12.90 [*]	13.99 [*]
Never married	14.52 [*]	24.07 ^{***}	33.11 ^{***}	33.75 ^{***}
Youngest child aged 6-15	-8.39 ^{**}	-9.48 ^{**}	-3.04 ^{**}	-3.53 ^{***}
Youngest child aged 16+	-19.82 ^{***}	-19.23 ^{**}	-8.57 ^{***}	-10.11 ^{***}
No dependent child	-14.94 ^{**}	-15.00 ^{**}	-8.94 ^{***}	-11.17 ^{***}
Number of children is 2	-4.21	-3.29	1.01	1.07
Number of children is 3+	4.26	3.07	1.81	1.81
bachelor degree or more	-8.03 ^{**}	-12.86 ^{**}	-4.54 ^{***}	-9.04 ^{***}
other post school qual.	0.86	1.11	0.12	-0.45
Year 12	1.54	1.26	-0.50	-1.16
Aboriginal	5.52 [*]	8.37 [*]	1.24	6.12 [*]
Good health	-3.79	-4.35	0.62	0.03
Fair health	3.24	7.26 [*]	2.73	1.70
Poor health	-0.48	3.06	3.54	2.15
% time in employment	-0.44 ^{***}	-0.56 ^{**}	-1.14 ^{***}	-0.74 ^{***}
Married before 1 st birth	-1.50	-4.07	-1.99 ^{**}	-4.90 ^{***}
Born in a NESC	-4.55	-3.96	1.05	1.71

Note: ^{***} significant at 1%; ^{**} significant at 5%; ^{*} significant at 10%.

For teenage mothers, welfare receipt in the previous year increases the probability of welfare participation in the current year by 30 percentage points if they have no dependent child, compared to 9 percentage points for those who have a youngest child aged five or under (column 2, Table 4). For older mothers, the average partial effects are smaller: 19 percentage points compared to 4 percentage points for those without children versus those with a youngest child aged five or under (column 4, Table 4). These results suggest the presence of strong state dependence in welfare participation,

which is larger for teenage mothers than for older mothers. The estimates of θ for both groups of mothers are significantly different from zero, indicating that initial conditions are endogenous. Thus, it is important to account for the endogeneity of initial conditions in the dynamic model.

As discussed earlier, unobserved individual effects (represented by ρ) might be another source of welfare dependency over time. For both groups of mothers, the likelihood ratio test of the null hypothesis that $\rho=0$ (the absence of unobserved individual heterogeneity) in the dynamic random effects probit is strongly rejected.¹² This suggests that it is important to allow for individual effects in the model. The estimates for ρ in Table 3 imply that 40 per cent of the unexplained variation in welfare participation for teenage mothers and 62 per cent for older mothers can be attributed to unobserved individual effects. These estimates suggest a high degree of welfare persistence due to unobserved individual effects for both groups of mothers, but more strongly for older mothers. With these individual effects included in the model (Table 3, columns (2) and (4)), the extent of state dependence becomes smaller for both groups of mothers, compared to results from the pooled model (Table 3, columns (1) and (3)).

The estimated effects of the other variables on the probability of welfare participation are in general larger (in absolute value) when using the random effects estimator compared to using the pooled probit estimator. The probability of welfare participation is significantly and negatively associated with the time spent in paid work since leaving full-time education for both groups of mothers. For teenage mothers, the probability of welfare participation decreases by approximately 0.56 percentage points for a one percentage point increase of the proportion of years in paid work. Being 'divorced/separated' or 'never married' significantly increases the probability of welfare participation for both groups of mothers. Relative to teenage mothers who are currently partnered (married or de facto), teenage mothers who have never been married (or who are divorced/separated) are expected to have a probability of welfare participation which is 24 percentage points (or 17 percentage points) higher (see column 2 of Table 4). The effects are much larger for older mothers. Older mothers who have never been

¹² Likelihood-ratio test of $\rho=0$: for teenage mothers, $\lambda^2(1) = 150.53$, $\text{Prob}>\lambda^2 = 0.0000$, for older mothers, $\lambda^2(1) = 719.33$, $\text{Prob}>\lambda^2 = 0.0000$.

married (or who are divorced/separated) are expected to have a probability of welfare participation which is 34 percentage points (or 33 percentage points) higher (see column 4 of Table 4). This difference in the effect of marital status is possibly due to the “higher” quality of the older mothers’ partners if they are married or living in a de facto relationship.¹³

For teenage mothers, having fair general health increases the probability of welfare participation by 7 percentage points relative to having excellent or very good general health. None of the health variables are significant for the older mothers.¹⁴ The effect of the level of highest education on teenage mothers’ welfare participation is less significant than the effects of these characteristics for older mothers. However, the size of the effect on welfare participation of having a university degree compared to having less than Year 12 is larger for teenage mothers than for older mothers. The expected decrease in welfare participation is nearly 13 percentage points for teenage mothers versus just over 9 percentage points for older mothers. As an informal check of the importance of the low educational attainment of teenage mothers, we also estimate the same models for the group of older mothers who left school before or at age 16. The coefficients are mostly in between those for teenage mothers and older mothers but remain very close to those of older mothers.¹⁵ Education appears to be only a small part of the explanation of higher welfare participation for teenage mothers in Australia.¹⁶

5. Conclusions

Similar to the situation in the UK and the US, the descriptive analysis showed that the circumstances of teenage mothers in Australia are less favourable than those of older mothers are. First, teenage mothers have relatively disadvantaged childhood backgrounds when compared to older mothers. Second, they are disadvantaged in a range of current characteristics. Teenage mothers are less likely to be partnered (and were less likely to be married at the time the first child was born). They are more likely to be unemployed or out of the labour force, as are the teenage mothers’ partners (for

¹³ Goodman, Kaplan and Walker (2004) found that having no partners or partners with low human capital may have contributed to teenage parents’ welfare participation.

¹⁴ This is not to say that health is not important, since we have included averages over health status in the model as well, which are statistically significant. However, changes in health from year to year appear to have little effect on the welfare participation of older mothers.

¹⁵ These results are available from the authors.

¹⁶ This is in contrast to the finding for Canada, that education is more important than teenage motherhood in explaining bad labour market outcomes (Luong, 2008). She found that mothers with similar education had a similar probability of being in full-year full-time employment.

those who are partnered); and they have lower levels of education and tend to have left school early. Although there is a strong correlation between low education levels and teenage motherhood, it seems unlikely that teenage motherhood causes low educational outcomes, given the timing of school leaving which is usually before the teenagers become pregnant. Third, in terms of health (physical and mental), teenage mothers are considerably worse off than older mothers are. Finally, teenage mothers are much more likely to participate in welfare than are older mothers throughout their lifetimes.

The main question addressed in this paper is whether the factors that determine the welfare participation of teenage mothers differ from the factors that determine welfare participation of older mothers. We applied the dynamic random effects probit model to estimate the extent of state dependence in welfare participation, while allowing for observed and unobserved individual heterogeneity. We found evidence of strong state dependence for both groups. Previous welfare receipt is important in determining current welfare participation for both groups of mothers, and it appears to become a more important factor as children grow up. On average, the marginal effect of being a welfare recipient in the previous year increases the probability of welfare participation more for teenage mothers than for older mothers, suggesting that state dependence is more important for teenage mothers than for older mothers. On the other hand, there is also a high degree of persistence in welfare participation due to unobserved individual effects, particularly for older mothers.

Regarding other relevant factors, mothers who spent a larger proportion of time in paid work after leaving full-time education are less likely to participate in welfare. The effect for older mothers is higher than for teenage mothers. A change in health status is important for teenage mothers but not for older mothers. Compared to good or excellent health, having fair health increases the probability of welfare participation for teenage mothers. University education is negatively associated with welfare participation for both groups of mothers. Being divorced or separated, or having never been married are important for both groups of mothers, with the effect being much larger for older mothers, possibly due to the higher “quality” of the partners of the older mothers.

Overall, our findings suggest that early intervention that prevents people from relying on welfare may be more important in reducing future utilisation of welfare benefits for

teenage mothers than for older mothers, because state dependence plays a bigger role in the welfare dependency of teenage mothers. In Australia, policy makers have been mainly concerned with the potential interference of teenage motherhood with teenage mothers' school education, because lower education is associated with adverse labour market outcomes and therefore higher welfare dependency. However, our evidence on teenage mothers' poor health and its link to welfare participation suggests that assistance to improve teenage mothers' health status may be equally (or more) important in reducing their welfare participation over their lifetime.

Appendix: Additional tables

Appendix Table 1. Demographic characteristics of teenage and older mothers

	<i>Teenage mothers</i>		<i>Older mothers</i>	
	Mean	(std err)	Mean	(std err)
Age (mean)	42.20	(0.22)	43.55	(0.08)
Number of children ever had (mean)	2.99	(0.03)	2.36	(0.01)
<i>Number of own resident children (mean)</i>				
all ages together	1.19	(0.03)	1.54	(0.01)
aged 0-4 yrs	0.25	(0.01)	0.34	(0.01)
aged 5-14 yrs	0.57	(0.02)	0.76	(0.01)
aged 15-24 yrs	0.32	(0.01)	0.39	(0.01)
aged 25+ yrs	0.07	(0.01)	0.05	(0.00)
	Proportion (%)		Proportion (%)	
Age group 15-19	4.42			
20-29	14.62		7.63	
30-39	20.51		29.52	
40-49	25.45		33.03	
50-59	29.57		24.14	
60-62	5.43		5.68	
<i>Marital status</i>				
Never married	14.04		3.85	
Legally married	46.90		71.45	
De facto	16.18		8.56	
divorced/separated	19.63		13.58	
Widowed	3.22		2.54	
Missing	0.03		0.01	
<i>Highest Education level</i>				
Year 11 and below	65.65		36.59	
Year 12	7.18		15.32	
Post-school diplomas/certificates	22.49		25.71	
University degree (Bachelor or more)	4.68		22.30	
Undetermined			0.07	
Indigenous origin	8.48		1.58	
Missing	21.61		25.00	
<i>Country of birth</i>				
Australia	78.39		75.00	
Main English speaking	11.15		10.04	
Other	10.46		14.95	
Missing			0.01	
<i>Among those not born in Australia</i>				
English was first language learned	54.29		46.30	
English was not first language learned	45.11		53.57	
Missing	0.60		0.13	

Appendix Table 1. (continued)

	<i>Teenage mothers</i> Proportion (%)	<i>Older mothers</i> Proportion (%)
<i>Childhood background</i>		
<i>When you were age 14 Living with</i>		
Both own parents	68.54	83.39
One of own parents and step parent	7.35	4.66
Father only	3.38	1.32
Mother only	11.67	8.25
other	9.07	2.36
Missing		0.01
<i>While you were growing up, father was</i>		
unemployed for 6 months or more	16.02	11.07
Employed or unemployed for < 6 months	70.75	83.27
Missing	13.23	5.66
<i>When you were age14, father was</i>		
employed	83.52	91.08
not employed	5.85	3.43
deceased	3.12	2.90
No father living with respondent	4.97	1.82
Missing	2.53	0.78
<i>When you were age14, mother was</i>		
employed	43.09	48.96
not employed	50.34	48.72
deceased	2.08	1.14
No mother living with respondent	1.49	0.25
Missing	2.99	0.93
Left home before the first birth	82.52	98.07
Missing	0.29	0.26
Married prior to the first birth	53.20	84.97
Missing	3.57	1.30
<i>Life satisfaction</i>		
High 8-10	63.96	67.60
Middle 5-7	30.61	29.57
Low 0-4	5.39	2.80
Missing	0.03	0.04
Total number of observations	3077	15342

Appendix Table 2. Labour market characteristics of teenage and older mothers

	<i>Teenage mothers</i>		<i>Older mothers</i>	
	Mean	(Std Err)	Mean	(Std Err)
<i>Proportion of years since full-time education</i>				
In paid work	0.51	(0.01)	0.68	(0.00)
Unemployed and looking for work	0.06	(0.00)	0.02	(0.00)
Not working and not looking for work	0.44	(0.01)	0.29	(0.00)
<i>Employment status (%)</i>				
Employed full time	22.91		27.70	
Employed part time	24.05		36.35	
Unemployed	5.91		2.56	
Not in the labour force	47.12		33.39	
<i>Income (in 2005 \$)</i>				
Current weekly gross wages/salaries in all jobs	217.55	(6.39)	344.59	(3.60)
Financial year gross wages/salaries	11982.0	(337.02)	19253.19	(194.28)
	4			
<i>For the employed</i>				
Hours per week usually worked in all jobs	31.99	(0.44)	29.81	(0.15)
<i>Job satisfaction (%)</i>				
High 8-10	68.58		66.63	
Middle 5-7	26.30		28.30	
Low 0-4	5.12		5.01	
			0.06	missing
<i>Partner's employment status (%)</i>				
Employed Full time	62.61		77.55	
Employed part time	6.94		8.23	
Unemployed	4.24		2.02	
Not in the labour force	26.20		12.20	
<i>Partner's income (in 2005 \$)</i>				
Current weekly gross wages/salaries in all jobs	563.44	(15.66)	834.03	(8.25)
Financial year gross wages/salaries	30377.1	(841.18)	46180.86	(464.10)
	1			
Number of observations	3077		15342	

Appendix Table 3. Health status of teenage and older mothers

	<i>Teenage mothers (in %)</i>	<i>Older mothers (in %)</i>
<i>Self-reported health</i>		
Excellent	7.25	11.26
Very good	24.57	36.43
Good	33.31	32.06
Fair	18.23	10.20
Poor	5.00	2.24
Missing	11.63	7.82
<i>Have a long-term health condition</i>		
	30.81	19.16
<i>Spent less time in work or other activity due to:</i>		
A physical reason	18.75	12.81
Missing	12.77	7.96
An emotional reason	18.98	11.80
Missing	12.64	7.93
Both physical and emotional reasons	10.89	5.40
<i>Mental health: Felt down</i>		
All of the time	2.18	1.05
Most of the time	5.56	2.72
A good bit of the time	7.31	5.69
Some of the time	22.59	19.60
A little of the time	34.25	40.49
None of the time	16.74	23.07
Missing	11.37	7.37
<i>Mental health: Been a happy person</i>		
All of the time	8.51	7.91
Most of the time	40.33	48.19
A good bit of the time	15.60	17.51
Some of the time	16.96	13.82
A little of the time	5.78	4.35
None of the time	1.59	0.96
Missing	11.21	7.25
<i>Disability Support Pension recipients</i>		
	10.46	3.31
Total number of observations		
	3077	15342

Appendix Table 4. Variable definitions

Variable	Definition
wfp-1 * youngest 0-5	<i>Lagged welfare participation</i> (wfp _{t-1}) interacted with the youngest dependent child being aged 0-5
wfp-1 * youngest 6-15	<i>Lagged welfare participation</i> (wfp _{t-1}) interacted with the youngest dependent child being aged 6-15.
wfp-1 * youngest 16+	<i>Lagged welfare participation</i> (wfp _{t-1}) interacted with the youngest dependent child being aged over 16.
wfp-1 * no child	<i>Lagged welfare participation</i> (wfp _{t-1}) interacted with not having dependent children.
age	Age in each wave
age ²	Age squared
Divorced/separated	=1 if divorced/separated
Widowed	=1 if widowed
Never married	=1 if never married
Youngest aged 6-15	=1 if the youngest dependent child is 6-15 years old.
Youngest aged 16+	=1 if the youngest dependent child is over 16 years old.
No dependent child	=1 if no dependent children.
Number of children is 2	=1 if the number of dependent children is two
Number of children is 3+	=1 if the number of dependent children is three or more.
bachelor degree or more	=1 if the highest education level is a university degree
other post school qual.	=1 if the highest education level is a post-school diploma/ certificate
Year 12	=1 if the highest education level is Year 12
Aboriginal	=1 if of indigenous origin
Good health	=1 if self-reported health is good
Fair health	=1 if self-reported health is fair
Poor health	=1 if self-reported health is poor
% time in employment	Since full-time education, proportion of years in paid work
Married before 1 st birth	=1 if married prior to the first birth
Born in a NESCS	=1 if born in non-English speaking country
waved2	=1 for Wave 2
waved3	=1 for Wave 3
waved4	=1 for Wave 4

Note: A child living with his or her mother is defined to be dependent if under 15 years of age or if aged 15-24 years and in full-time study (and not employed full-time or living with a partner or a child of his or her own).

References

Arulampalam, W. (1999) "Practitioners' corner: a note on estimated coefficients in random effects probit models," *Oxford Bulletin of Economics and Statistics*, 61(4): 597-602.

Bradbury, B. (2006) "The impact of young motherhood on education, employment and marriage," Social Policy Research Centre Discussion Paper No. 148.

Chamberlain, G. (1980) "Analysis of covariance with qualitative data," *The Review of Economics Studies*, 47(1): 225-238.

Ermisch, J. and D. J. Pevalin (2003) "Does a 'teen-birth' have longer-term impacts on the mother? Evidence from the 1970 British Cohort Study," ISER Working Paper No. 2003-28.

Ermisch, J. and D. J. Pevalin (2005) "Early motherhood and later partnerships," *Journal of Population Economics*, 18: 469-489.

Fletcher, J. M. and B. L. Wolfe (2008) "Education and labor market consequences of teenage childbearing: evidence using the timing of pregnancy outcomes and community fixed effects," National Bureau of Economic Research Working Paper No. 13847, Cambridge.

Goodman, A., G. Kaplan and I. Walker (2004) "Understanding the effects of early motherhood in Britain: the effects on mothers," IFS working paper W04/20.

Heckman, J. (1981) "The incidental parameters problem and the problem of initial conditions in estimating a discrete time discrete data stochastic process," in C.F. Manski and D.L. McFadden (eds.), *Structural Analysis of Discrete Data with Economic Applications*, Cambridge: MIT press

Hoffman, S. D., E. M. Foster and F. F. Jr. Furstenberg (1993) "Reevaluating the costs of teenage childbearing," *Demography*, 30(1): 1-13.

Hotz, V. J., S. McElroy and S. Sanders (2005) "Teenage childbearing and its life cycle consequences: exploiting a natural experiment," *Journal of Human Resources*, 40(3): 683-715.

Jeon, S. H., G. Kalb and H. Vu (2008) "Teenage mothers' income support, education and paid work: the dynamics of welfare participation," Final Report 7/07 for the Department of Education, Employment and Workplace Relations; the report is available on the Melbourne Institute website ([http://melbourneinstitute.com/labour/Social Policy Contract/7-07 Final Report.pdf](http://melbourneinstitute.com/labour/Social%20Policy%20Contract/7-07%20Final%20Report.pdf)).

Liao, T. F. (2003) "Mental health, teenage motherhood, and age at first birth among British women in the 1990s," Institute for Social and Economic Research Working Papers, Number 2003-33, Colchester: University of Essex.

Luong, M. (2008) "Life after teenage motherhood," *Perspectives*, May 2008, Statistics Canada, Catalogue no. 75-001-X, 5-13.

Morehead, A. and G. Soriano (2005) "Teenage mothers: constructing family: what are the supports, pressures and additional labour that shape decisions teenage mothers make about family life?" *Family Matters*, 72: 64-71.

Mundlak, Y. (1978) "On the pooling of time series and cross section data," *Econometrica*, 46(1): 69-85.

Webbink, D., N. G. Martin, and P. M. Visscher (2008) "Does teenage childbearing increase smoking, drinking and body size?" *Journal of Health Economics*, 27: 888-903.

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.