

Preliminary version

The dynamics of welfare participation among women who experienced teenage motherhood

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Abstract:

The main objective of the paper is to investigate whether the factors that influence welfare participation of women who experienced teenage motherhood differ from the factors that influence welfare participation of mothers in general. In addition, we examine to what extent observed persistence in welfare participation can be attributed to state dependence or to unobserved heterogeneity. The analysis in this paper is based on the Household, Income and Labour Dynamics in Australia (HILDA) Survey. The multivariate analysis of welfare participation uses dynamic random effects probit modelling, in which the panel data features of the HILDA data are fully taken into account. We compare the results from a panel approach dealing with the initial conditions problem with the results of a more simple pooled probit analysis, which does not take the panel feature of the data into account.

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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 Survey, which is managed by the Melbourne Institute of Applied Economic and Social Research. The views expressed in this paper are those of the authors alone, and do not represent the views of FaHCSIA or the Commonwealth Government.

1. Introduction

This study investigates welfare participation at different stages in life for women who experienced teenage motherhood. This paper defines teenage mothers as women who had their first child between age 15 and 19. Their welfare participation is compared with those of mothers who had their first child at an older age (20 years or over). Welfare participation of teenage mothers is of interest, since it captures poverty better than labour market outcomes alone could do. A relatively large proportion of mothers combine welfare payments with (part-time) employment. A number of researchers have analysed the effect of teenage motherhood on welfare receipt¹, whereas our aim is to investigate the factors affecting welfare receipt of teenage mothers and compare this to the factors affecting older mothers. In addition, our study is not limited to welfare receipt in the short term (the latest effects in the literature are usually measured at age 30) or at one point in time, but it analyses welfare receipt across the life-cycle (between 20 and 62 years of age) and for a period of up to five years.

Research findings consistently indicate a correlation between having a first child at an early age and poor socioeconomic outcomes, although it is a subject of debate whether teenage parenthood is a causative factor of poor socioeconomic outcomes. 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). In fact, Australia's teenage fertility rate continues to decline. In 2006, it was at 15.4 babies per 1000 teenage women, the lowest on record (Australian Bureau of Statistics, 2007: p. 18). In other countries, there has also been a decline (Organisation for Economic Co-Operation and Development, 2007). Teenage mothers make up only one per cent of all single mothers in Australia, but they are of concern in relation to income support policies. At three per cent, teenage mothers are overrepresented as recipients of the main income support payment for single mothers (Morehead and Soriano, 2005). In Australia, around two thirds of Parenting Payment Single recipients, and half of Parenting Payment Partnered recipients, had their first child before age 25. Further, around one third of single recipients with a youngest child

¹ See for example, Fletcher and Wolfe (2008), Goodman, Kapan and Walker (2004), or Hotz, McElroy and Sanders (2005). Section 2 provides a brief literature review on the effect of teenage motherhood on labour market outcomes.

aged below 6 years had their first child before age 20. This is in contrast to a median age at first birth of around 30 in the overall Australian population.² Understanding more about the factors influencing the welfare participation of (former) teenage mothers will assist in developing strategies to assist them under the Welfare to Work programme.

Possible reasons identified in other research for high welfare participation rates include low human capital (early school leaving appears 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, Kapan and Walker, 2004). As found in some international studies, health also plays a role in low socio-economic status outcomes and subsequent welfare participation (Liao, 2003).

The general analysis in this paper is based on the Household, Income and Labour Dynamics Survey (HILDA), which is a longitudinal data set collecting information on all individuals for a number of randomly selected households on a yearly basis. The survey has a retrospective component, asking about any children individuals have had and their ages, which allows determination among all respondents of whether or not teenage parenthood occurred.

An advantage of longitudinal information is that we can observe outcomes over time; in this case, five years are available. One way of understanding the factors that influence the welfare participation of (former) teenage mothers is to consider if the higher rate of welfare participation can be attributed to state dependence. We often observe that individuals who have experienced an event in the past are more likely to experience that event in the future. One explanation is that as a consequence of experiencing an event, preferences, prices or constraints relevant to future choices are altered (that is, there is state dependence). A second explanation is that individuals may differ in certain unmeasured variables (that is, there is unobserved individual heterogeneity persisting over time) which influence their probability of experiencing the event. In the first case, past experience has a genuine behavioural effect in the sense that an otherwise identical individual who has not experienced the event will behave in a different way in the future compared to an individual who has experienced the event. In the second case,

² This is also the optimal age according to Mirowsky and Ross (2002) when well-being as a parent is the measure. It minimises the probability of depression for women.

however, previous experience only appears to be a determinant of future experience because it is a proxy for temporally persistent unobservable factors that determine choices.

Distinguishing state dependence from other sources of welfare persistence 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, labour market policies may be less effective and the underlying (unobserved) causes of welfare participation need to be addressed.

A dynamic random effects probit model is applied to estimate this state dependence and assess the effects of a range of individual and household characteristics. Here, state dependence, whereby an individual's tendency to be dependent on welfare benefits depends on past participation in welfare, is distinguished from persistence due to time-invariant individual unobserved heterogeneity, which could be an alternative cause of persistent participation in welfare benefits. In addition, this model accounts for the endogeneity of the initial condition, while controlling for differences in observed and unobserved characteristics between individuals. In particular, the approach suggested by Heckman (1981) is implemented to deal with the initial condition problem in a dynamic random effects probit model.

The paper proceeds as follows. Section 2 presents a brief review of some recent studies on teenage motherhood and labour market outcome. Section 3 describes the data, provides an explanation of the key definition of teenage motherhood and presents some summary statistics. Section 4 describes the multivariate methods used and reports the estimation results. Section 5 concludes.

2. Literature Overview

A general concern with young motherhood is the negative impact on socio-economic outcomes in later years of life, because teenage motherhood is prone to interfere with human capital investment by raising the opportunity cost of time spent in education. Earlier studies were based on linear models, mostly controlling for observed individual characteristics only. Most of these studies have found that early motherhood has a negative effect on educational achievement and later labour market outcomes. However, these results were questioned because of their failure to account for the potential endogeneity of the fertility decision. For example, teenage childbearing and schooling decisions could be influenced by common unobservable individual characteristics, leading to overestimation of the negative consequences of teenage childbearing on schooling.

In the last decade, a number of new studies have used a variety of innovative methods to control for unobserved characteristics influencing selection into teenage motherhood. A number of methods, including an individual or family level fixed effects model, a simultaneous equation model, a natural experiment, an instrumental variables analysis and a propensity score matching method, have been applied to enable controlling for unobservable individual characteristics and constructing the counterfactual outcome for teenage mothers. Recent studies in the US and UK, using these approaches, provide evidence that the negative effects of teenage motherhood on education, labour market outcomes and welfare participation may be much less than those conventionally estimated (Goodman, Kapan and Walker, 2004; Hotz, McElroy and Sanders, 2005; Ermisch and Pevalin, 2003, 2005). Fletcher and Wolfe (2008) allow for the possibility that miscarriage, which is often used as an instrumental variable for teenage motherhood, is not a random event. That is, community-level factors could influence the probability of miscarriage. They, therefore use the school-based design of their data to group teenagers into communities and include community-level fixed effects in their analysis. After controlling for selectivity of miscarriage, they find no real effect of teenage motherhood on educational attainment or on welfare reciprocity, but they reveal a large negative effect on earnings.

In a recent Australian study, using a new Australian panel data set of young women (Australian Longitudinal Study of Women's Health) and using miscarriage as an instrument for teenage motherhood, Bradbury (2006) found no evidence for a negative effect of young motherhood on education, labour market outcomes, income or location in Australia. He only found an impact of young motherhood on partnering outcomes. Being a young mother reduces the likelihood of being legally married when aged in her late 20s, and leads to a greater likelihood of being a lone parent around age 30.

New approaches have generated a debate in the literature as to whether once individual unobserved characteristics are controlled for, any negative effects caused by early childbearing remain. However, drawing any robust conclusions from this debate has been difficult due to the sensitivity of the results to the empirical methodology chosen and the data set being used. 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.

Although there is ongoing debate on the causality of poor labour market outcomes for women who experienced teenage motherhood, the fact that these women have poor socio-economic outcomes and high welfare dependency is not disputed. This paper is particularly interested in the difference between the factors associated with welfare participation of women who were teenage mothers and welfare participation of women who became a mother at an older age, not just in the short term but also in the longer term. This will help to understand the difference in determinants of welfare participation of women who had a first child at an early age from those of women who had their first child at an older age across the mother's life cycle (from age 20 up to age 62). This improved understanding would be helpful in developing strategies under the Welfare to Work programme to assist women who experienced teenage motherhood.

3. The data

3.1 Sample selection and definition of variables

We use five waves (from year 2001 to year 2005) of the Household, Income and Labour Dynamics Survey (HILDA), which is a representative sample from the general

Australian population. Based on the HILDA, current socio-economic conditions of women who experienced teenage motherhood are documented and a multivariate panel model of their welfare participation is estimated.

A major advantage of the HILDA data set is that it contains the age of female respondents and the age of any children they have had, independent of whether these children are currently residing in the same household as their mother or not. This enables us to identify all women who once experienced teenage motherhood, independent of how long ago this occurred. Another advantage of this data set is that it contains information on whether women are in or out of income support. Combined with the longitudinal nature of the HILDA, this means that we can study the dynamics of welfare participation of these women.

We identify women who gave birth for the first time before age 20 to generate the main variable required for the analysis using HILDA. Women who had their first child between age 15 and 19 have been identified using variables regarding the woman's own age and the age of her oldest child. Women who are calculated to have had their first child while being younger than 15 years have not been included in our analysis. The data does not allow us to separate the women's own birth children from their adopted children. Although this potential measurement error is likely to be trivial, we have minimised this error by dropping women who have age differences between them and their first child of less than 15 years.³

Women 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 aged 15 to 62 are identified as women who experienced teenage motherhood. Table 1 presents a few characteristics of teenage mothers. Of this group, most women are first observed in wave 1. At the time of the first observation, the majority of women is aged between 40 and 60 years of age.

³ Only 27 women are calculated to have become a mother between 2 and 14 years of age using the formula of subtracting their oldest child's age from their own age.

Table 1. Number of teenage mothers in HILDA

	Number of teenage mothers
<i>Total number of teenage mothers</i>	839
<i>Wave of first observation</i>	
Wave 1	684
Wave 2	41
Wave 3	43
Wave 4	36
Wave 5	35
<i>Age of the teenage mothers at the time of the first observation</i>	
15-19	52
20-29	159
30-39	173
40-49	204
50-59	218
60-62	33

Data source: Authors' own computations based on the HILDA.

3.2. Summary statistics

The descriptive analysis documents the current socio-economic status of women who experienced teenage childbearing. The first subsection presents tables on demographic characteristics, including education. The second subsection discusses health status variables, and a table of labour market characteristics is presented in the third subsection. The final subsection describes the incidence of income support.

3.2.1 Demographic and labour market characteristics

In the descriptive analysis in this subsection (and the following three subsections), the data from all five waves are pooled. The demographic characteristics of women who experienced teenage motherhood versus women who had their first child at an older age are presented in Table 2. It shows that women who start motherhood as a teenager 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 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 parent's home.

Table 2 shows that, on all fronts, teenage mothers are likely to have lived in less favourable circumstances throughout their lives. Teenage mothers' educational attainment is lower than for older mothers and a larger proportion of them, compared to the older mothers, lived in a single-parent household (mostly single-mother households) when they were 14 years old. In addition, both their father and mother were less likely to have been employed when they were 14 years old. The HILDA shows that being

from an indigenous background increases the probability of being a teenage mother.⁴ Comparing country of birth, we find that women born in Australia and women born outside Australia whose first language was English are slightly more likely to be or have been a teenage mother. Finally, compared to the older mothers, a larger proportion of (former) teenage mothers report a low current life satisfaction indicating that overall they appear to be less satisfied with their circumstances than older mothers.

Table 2. Demographic characteristics for women who experienced teenage childbearing and for older mothers

	<i>Teenage mothers</i>		Older mothers	
	Proportion (%)	(std err)	Proportion (%)	(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)
<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	

⁴ Although the number of indigenous women is small in the HILDA data, this result was confirmed using the Census data (Jeon, Kalb and Vu, 2008).

Table 2. Continued

	<i>Teenage mothers</i>	Older mothers
	Proportion (%) (std err)	Proportion (%) (std err)
<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 age 14, 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 age 14, 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

Data source: Authors' own computations based on the HILDA

One of the general concerns with teenage motherhood is its interference with the women's school education, such as dropping out of school due to childbearing and Table 2 indeed shows low educational attainment of teenage mothers. The question is whether teenage motherhood is the cause of these low levels of education, or more specifically, whether or not childbearing is causing high-school drop out. To shed some light on this matter, Table 3 shows a cross tabulation between the woman's age at which she became a teenage mother and the age at which she left school.

The table shows that older mothers and women without children are much more likely to stay at school until a later age, and are therefore more likely to finish at least Year 12. Typically, women who had a teenage birth left school before becoming a mother, with

the most popular school-leaving age being 15. Most of the women, who became a mother at age 18 or 19, left school at age 15 or 16. This school-leaving age may reflect the legal school-leaving age minimum. This differs state by state but currently is around 16 in most states.⁵ All age groups show similar patterns.⁶ Overall only 165 women of the 839 teenage mothers left school at the age of becoming a mother or the year before the event. That is, the majority of women left school before they fell pregnant. Very few women (only 16) continue school beyond the age at which they have become a mother.

Table 3. Age of leaving school for the different groups of women

Age left school	<i>Teenage mothers</i>					<i>Teenage mothers</i> total	<i>Older mothers</i> total	<i>Childless women</i> total
	<i>Age became a teenage mother</i>							
	15	16	17	18	19			
Never went	0	0	2	0	0	2	4	0
Still at school	0	0	1	0	0	1	0	411
9-11	2	1	1	2	6	12	22	5
12-14	2	22	28	44	54	150	271	47
15	13	33	66	91	104	307	796	187
16	5	16	34	66	113	234	988	373
17	0	2	7	35	55	99	1157	970
18	1	0	6	6	17	30	665	764
19	0	0	1	0	2	3	74	61
20-23	0	0	0	0	1	1	22	12
missing						0	5	1
total	23	74	146	244	352	839	4004	2831

Data source: Authors' own computations based on the HILDA

Note: the numbers of older mothers and women without children are based on the last observed wave.

Table 3 provides an important insight. Teenage motherhood does not appear to cause early school leaving directly, since by the time the teenager becomes a mother, she has already left school in most cases. However, there may be factors that contribute both to teenage motherhood and to early school leaving. Examples of such unobserved factors are childhood disadvantage or peer groups' influences. As a result of these common factors, teenage mothers generally have low education levels. There may be a direct

⁵ 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.

⁶ The explanation that this is a reflection of the lifecycle of an older generation, in which many women had low educational attainment and married early, and therefore, became a mother at a younger age than is common now, does not hold. The only difference between 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. From a comparison of birth cohorts, another difference emerges. Amongst the more recent birth cohorts, the proportion of women who became teenage mothers decreased as can be seen from the lower proportion of teenage mothers in the younger age groups in Appendix Table 1 (possibly at least partly due to the increased use of effective contraception).

effect from early school leaving on teenage motherhood as well, but we cannot explore this with the HILDA data, since insufficient information is available on the activities of the teenagers at and before the time of their school leaving and pregnancy.

3.2.2 Health status

Women who experienced teenage childbearing are more likely to experience bad health outcomes in a number of dimensions. Table 4 shows current mental and physical health conditions of women who experienced teenage childbearing. The general self-reported health status of women who experienced teenage motherhood is poorer than the health status of women who became a mother at an older age. The 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 the older mothers.

Table 4. Health status of women who experienced teenage childbearing and of older mothers

		<i>Teenage mothers (in %)</i>	Older mothers (in %)
<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
Total number of observations		3077	15342

Data source: Authors' own computations based on the HILDA

Teenage mothers are also more likely to report a long-term condition or to have been affected in their work or other activities due to physical or emotional reasons. In addition, they are more likely to be affected in these activities due to both physical and emotional reasons. 41 per cent of teenage mothers who are affected in their work or other activities due to physical or emotional reasons are affected due to both reasons, whereas this is the case for 28 per cent of older mothers only. Their mental health is also poorer, as indicated by teenage mothers having felt down for a larger proportion of time and having been a happy person for a smaller proportion of time than older mothers.⁷ In addition, teenage mothers are more likely to report a long-term health condition in relation to mental health. As can be seen in Appendix Table 2,⁸ teenage mothers are more likely to report a nervous or emotional condition which requires treatment (19.60 per cent) and any mental illness which requires help or supervision (5.15 per cent) than older mothers are (13.67 per cent and 3.74 per cent).

The proportion of mothers on Disability Support Pension is also much higher amongst teenage mothers (10.46 per cent) than amongst older mothers (3.31 per cent). 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 Parenting Payment Single). However, the majority of mothers who receive a Disability Support Pension report having a long-term health condition.

Certain types of disability, conditional on reporting a long-term health condition, can be identified from Appendix Table 2. In general, teenage mothers are more likely to suffer from any of the types of long-term health conditions than older mothers are. In addition, Appendix Table 3 shows that teenage mothers are more likely to have multiple long-term health conditions than older mothers are. Appendix Tables 2 and 3 also show that

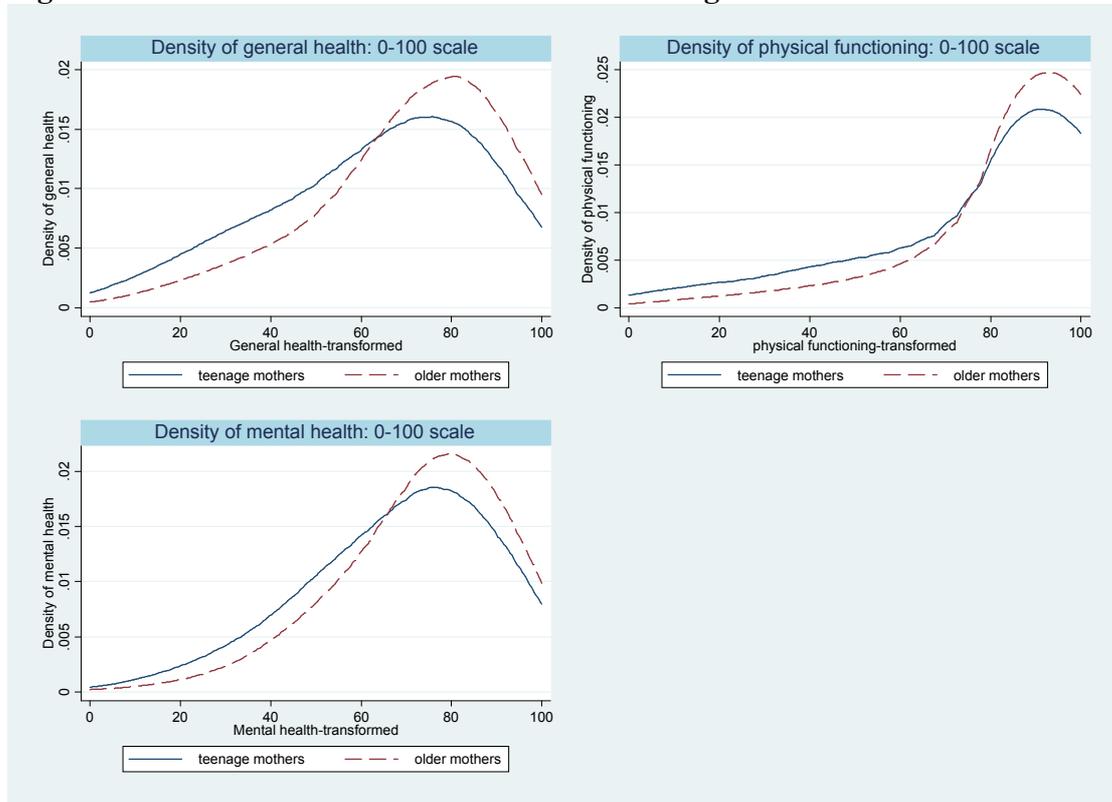
⁷ This is true with the exception of the proportion who have been a happy person all of the time, which is slightly higher for teenage mothers.

⁸ HILDA has no information on diagnosed mental health conditions, but from wave 3 onwards, respondents report the types of long-term health conditions from which they suffer. From these, some long-term mental health conditions can be identified.

DSP recipients are much more likely to suffer from any of the types of long-term health conditions than other women and that they are much more likely to suffer from 3 or more conditions at the same time. Differences in the prevalence of long-term health conditions between teenage and older mothers are less pronounced for Disability Support Pension recipients.

Three different measures of health are presented in Figure 1, representing general health, physical functioning and mental health for the two groups of mothers. The measures range on a 0 to 100 scale, with 0 being the worst health outcome and 100 being the best health outcome. 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 the older mothers.

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



Data source: Authors' own computations based on the HILDA

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

3.2.3 Labour market characteristics

Table 5 presents a range of summary statistics on labour market characteristics for the two groups of mothers. Teenage mothers have spent less time in paid work and more

time out of the labour force as a proportion 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, in particular part time, compared to older mothers. However, when working, they work on average more hours and appear somewhat more satisfied with their job than the older mothers. 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 result of the lower participation (and perhaps the lower educational attainment) of both teenage mothers and their partners, both the teenage mothers' incomes and their spouse's incomes are lower than for older mothers. Thus, on all aspects of labour market outcomes, teenage mothers have worse outcomes than older mothers.

Table 5. Labour market characteristics for women who experienced teenage childbearing and for older mothers

	<i>Teenage mothers</i>		Older mothers	
	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	11982.04	(337.02)	19253.19	(194.28)
<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	
			missing	0.06
<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	30377.11	(841.18)	46180.86	(464.10)
Number of observations	3077		15342	

Data source: Authors' own computations based on the HILDA

3.2.4 Welfare participation

Mothers are classified as welfare participants if they reported a positive amount of welfare payment from any of the following government pensions or allowances: NewStart Allowance, Mature Age (Partner) Allowance, Service Pension (paid by the Department of Veteran Affairs), Disability Support Pension (paid by Centrelink), Wife Pension, Carer Payment, Sickness Allowance, Widow Allowance (Widow B pension) (paid by Centrelink), Special Benefit, Partner Allowance, Parenting Payment (not included are Family Allowance or Family Tax Benefit), Youth Allowance, and Austudy/Abstudy Payment. This classification of welfare participation is done separately for each wave.

Table 6 shows welfare participation rates of women who experienced teenage motherhood by age groups. On average over the five waves of HILDA, 45.2 per cent of women who experienced teenage motherhood are income support recipients. The statistics are based on pooled data, in which the total number of observations on teenage mothers is 3,077, of which 1,391 women were on welfare at the time of the observation. The women are grouped into six age categories based on their age in each wave. The two youngest age categories have the highest welfare participation rates, probably reflecting the young age of their children. The welfare participation of women who became mothers at an older age is clearly much lower (21.7 per cent) due to their own and their partners' incomes from employment as reported in Table 5. The patterns of participation in welfare across age are similar for the two groups of mothers. The highest participation rate is found for mothers aged between 20 and 29 years of age and the lowest participation rate is found for mothers aged between 40 and 49 years of age.

Table 6. Welfare participation rates of women who were once teenage mothers and of older mothers by current age

Age group	<i>Teenage mothers</i>			<i>Older mothers</i>		
	Number of observations	Rate of welfare participation	Std. Err	Number of observations	Rate of welfare participation	Std. Err
15-19	136	.588	.042			
20-29	450	.662	.022	1170	.357	.014
30-39	631	.410	.020	4529	.217	.006
40-49	783	.349	.017	5068	.178	.005
50-59	910	.437	.016	3704	.213	.007
60-62	167	.497	.039	871	.273	.015
Total	3077	.452	.009	15342	.217	.003

Data source: Authors' own computations based on the HILDA

4. Multivariate analysis

First, the dynamic random effects probit model used in the multivariate analysis is described in Section 4.1, followed by the estimation results based on this model using the HILDA data in Section 4.2.

4.1 Methodology: Dynamic random effects probit model

A dynamic random effects probit model is applied to estimate state dependence, which is defined as the extent to which the participation in welfare in one year increases the probability of participating in welfare in the following year. The model, to be estimated here, accounts for the endogeneity of the initial conditions, while controlling for differences in observed and unobserved characteristics between individuals (observed and unobserved heterogeneity). To be specific, the approach suggested by Heckman (1981) is implemented to deal with the initial conditions problem in the dynamic random effects probit model. We also estimated the models using Wooldridge's (2005) approach, but since the results are quite similar only the results based on Heckman are presented.

In its most general form, the dynamic empirical model for welfare participation can be written as:

$$y_{it}^* = g y_{it-1} + \mathbf{b}' X_{it} + v_{it} \quad (1)$$
$$y_{it} = \begin{cases} 1 & \text{if } y_{it}^* \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

where y_{it}^* is the underlying latent variable for observed welfare participation (y_{it}). X_{it} is a vector of observed variables which may affect welfare participation (y_{it}) but which are uncorrelated with the error term v_{it} . In the dynamic model, g (representing state dependence) is a parameter to be estimated, while static models restrict g to be equal to 0. Repeated observations for a given group of individuals over time allow us to construct a model in which individuals may differ in their propensity to participate in welfare. Such individual (unobserved) heterogeneity is specified in estimation by decomposing the error term v_{it} into two separate terms: a constant component for each individual and a time-varying component. This is written as:

$$v_{it} = a_i + u_{it} \quad (2)$$

where a_i is an individual-specific and time-invariant random component, assumed to be normally distributed, having zero mean and variance S_a^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 a_i .

Thus, we estimate a random effects dynamic probit model of welfare participation (y_{it}), which is specified as:

$$y_{it}^* = g y_{it-1} + b' X_{it} + a_i + u_{it} \quad (3)$$

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

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

$$r = \text{Corr}(v_{it}, v_{is}) = \frac{S_a^2}{S_a^2 + S_u^2} \quad t, s = 2, \dots, T \quad \text{and} \quad t \neq s \quad (4)$$

where r 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 can be constructed to test the null hypothesis that $r = 0$, which tests for the presence of unobserved heterogeneity. If r is zero, the panel-level variance component is not important. That is, the panel estimator would not be different from the pooled estimator, in which no account is taken of individual-specific unobserved differences. In addition, although the random effects model assumes a_i to be uncorrelated with X_{it} , we also add \bar{x}_i , which is the average of the observations on the exogenous variables over the sample period, as regressors to the model in the actual estimation (Mundlak, 1978). This is aimed at controlling for the potential correlation between a_i and X_{it} .

We now turn to a potential source of bias arising from the initial conditions problem. The presence of state dependence in the form of a lagged dependent variable y_{it-1} introduces what is called an initial conditions problem. 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 the a_i , the estimator will be inconsistent and tend to overestimate g (that is, overstate the extent of state

dependence). Heckman (1981) therefore suggested that the initial welfare participation states are approximated by a reduced form equation:

$$y_{i1}^* = p'z_{i1} + h_i \quad (5)$$

where z_{i1} contains information from the first wave; and h_i is the standard normal distribution and correlated with a_i , but uncorrelated with u_{it} for $t \geq 2$. Using an orthogonal projection, the latter can be written as $h_i = \rho a_i + u_{i1}$, ($\rho > 0$) with a_i and u_{i1} independent of one another. Consistent estimates can then be estimated by jointly estimating the approximate reduced form probability of welfare participation for the initial state of the sample (5) and the latent dynamic welfare participation (3), using maximum likelihood. In the next section, only the results for (3) are presented since (5) is just an auxiliary equation. The only parameter of interest arising from (5) is ρ , its significance indicating whether there is endogeneity of the initial conditions. Therefore, ρ is included in the discussion of the results in the next section.

The estimation results are presented in the next section. In order to compare the behaviour of mothers who experienced teenage motherhood with those of older mothers, all women who are less than 20 years old (that is, those who are currently still teenage mothers) are excluded from the multivariate analyses. This is to ensure that similarly aged women are compared.

4.2 Results from the dynamic random effects probit estimation

Estimation results from the pooled dynamic probit and dynamic random effects probit allowing for the endogeneity of the initial conditions are reported in this section. In addition, for ease of interpretation, the average partial effects (APE) for the variables of interest from these models are presented. The average partial effects are computed by averaging individual marginal effects over the sample. The individual marginal effect of a variable is the predicted change in probability arising from a one unit increase in the relevant explanatory variable, while all other variables are kept at their observed value. For dummy variables, the marginal effect is calculated by first predicting the probability at the observed values of each of the variables while the relevant dummy variable is set to zero and then predicting the probability while the dummy variable is changed to one. The latter probability is subtracted from the first probability to obtain the individual marginal effect of this dummy variable.

Table 7 provides the definitions for each of the control variables used in the modelling. Before discussing the results, it is important to note that the random effects models and the pooled probit model, which ignores the cross-correlation between the composite error terms in different time periods for the same individual, use different normalisations. The random effects models use a normalisation based on the random error u_{it} ; that is, in those models unobservable individual effects are taken out of the error term. In the pooled probit, the unobservable individual effects are still part of the error term on which the normalisation is based. This is equivalent to the total error term v_{it} where no account is taken of the fact that individuals are observed more than once: observations on an individual at different points in time are treated as if they are observations on different individuals. As a result, to make the random effects estimates comparable to the pooled probit estimates, they need to be rescaled by multiplying the parameters by an estimate of $s_u/s_v = \sqrt{1-r}$, where $r = \frac{s_a^2}{s_a^2 + s_u^2}$.⁹ For consistency, the average partial effects are also computed using the scaled coefficients.

Table 7. Variable definitions

Variable	Definition
Lwfp	=1 if participated in welfare in wave T-1: <i>Lagged welfare participation</i>
age	Age in each wave
age ²	Age squared
divsep	=1 if divorced/separated
wid	=1 if widowed
nvrmar	=1 if never married
tcr04	Number of own resident children aged 0-4
tcr514	Number of own resident children aged 5-14
tcr1524	Number of own resident children aged 15-24
unideg	=1 if the highest education level is a university degree
pstsch	=1 if the highest education level is a post-school diploma/ certificate
yr12	=1 if the highest education level is Year 12
aborig	=1 if of indigenous origin
good	=1 if self-reported health is good
fair	=1 if self-reported health is fair
poor	=1 if self-reported health is poor
pertemp	Since full-time education, proportion of years in paid work
pertuemp	Since full-time education, proportion of years of unemployment and looking for work
mrbfnum	=1 if married prior to the first birth

⁹ See Arulampalam (1999) for a detailed discussion.

Table 7. Continued

Variable	Definition
bnengc	=1 if born in non-English speaking country
waved2	=1 for Wave 2
waved3	=1 for Wave 3
waved4	=1 for Wave 4
wfp0	=1 if participated in welfare in wave 1: <i>Initial welfare participation</i>

The importance of allowing for the individual random effect is shown by the strong rejection by the likelihood ratio test of the null hypothesis that $\tau = 0$ (the absence of individual heterogeneity) in the Heckman specifications in Table 8. Allowing for the endogeneity of the initial conditions in the random effects model, the estimator of ρ in columns 2 and 4 is significant. These results thus validate our choice for the dynamic random effects model which allows for the endogeneity of the initial conditions.

The effect of lagged welfare participation is smaller when the endogeneity of the initial conditions is allowed for together with including random effects estimators compared to the pooled estimator. The estimated effects of the other independent (X) variables are, in general, greater (in absolute value) when using the random effects estimators than the pooled probit estimator. In all columns of Table 8, the coefficients of lagged welfare participation are statistically significant and positive. The APEs in Table 9 suggest that being a welfare recipient in the previous wave increases the probability of welfare participation in the current wave by approximately 22 percentage points for the group of teenage mothers and 13 percentage points for the group of older mothers.

The probability of welfare participation is significantly and negatively associated with the time spent in paid work since full-time education for both groups of mothers. For the group of teenage mothers, the probability of welfare participation decreases by approximately 0.61 percentage points for a one percentage point increase of the proportion of years in paid work.

Being ‘divorced/separated’ or ‘never married’ significantly increase the probability of welfare participation for both groups of mothers. Relative to teenage mothers who are currently partnered (married/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 25 percentage points higher (see column 2 of Table 9). The effects are much larger for older women. Older mothers who have never been married (or who are divorced/separated) are expected to have a probability of welfare participation which is 38 percentage points higher (see column 4 of Table 9). 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.

Table 8. Coefficients for pooled and dynamic random effect probit

Variable	<i>Teenage mothers</i>		<i>Older mothers</i>	
	(1) pooled coef.	(2) Heckman scaled coef.	(3) pooled coef.	(4) Heckman scaled coef.
Lwfp	1.407***	0.722***	1.492***	0.563***
age	-0.086	-0.242*	-0.131**	-0.129*
age ²	0.023	0.055	0.022	0.058**
divsep	0.828***	0.637***	1.779***	1.343***
wid	0.875*	0.716*	1.005***	0.705***
nvrmar	0.835***	0.908***	1.815***	1.386***
tcr04	-0.011	0.012	0.118***	0.153***
tcr514	0.107**	0.090*	0.085***	0.126***
tcr1524	-0.107*	-0.09	-0.114***	-0.080**
unideg	-0.416**	-0.390*	-0.312***	-0.390***
pstsch	-0.007	-0.019	0.001	-0.045
yr12	0.135	0.139	-0.072	-0.126**
aborig	0.277*	0.360*	0.115	0.25
good	-0.079	-0.104	0.031	-0.013
fair	0.358**	0.361**	0.152	0.064
poor	0.194	0.19	0.171	0.092
pertemp	-3.883**	-3.228**	-3.438***	-2.334***
pertuemp	0.136	0.241	0.558**	0.752**
mrbfmum	-0.113	-0.227**	-0.088	-0.266***
bnengc	-0.118	-0.103	0.096	0.134
waved2	-0.252	-0.581	-0.266*	-0.164
waved3	-0.111	-0.36	-0.197*	-0.143
waved4	-0.02	-0.125	-0.098	-0.078
wfp0	0.564***		0.659***	
constant	-1.142*	0.409	-1.117**	0.415
Rho (r)		0.469***		0.590***
theta (q)		1.254***		1.087***

Data source: Parameters are estimated using the HILDA

Notes: 1. additional covariates are the averages per individual over the sample period of the observations on some of the exogenous variables and missing dummies. Averages are included for age, marital status, health status and the proportion of years in paid work since leaving full-time education.

2. *** significant at 1%; ** significant at 5%; * significant at 10%.

3. Likelihood-ratio test of rho=0:

Teenage mothers: Heckman (2): chi2(1) = 167.18 Prob > chi2 = 0.0000

Older mothers: Heckman (4): chi2(1) = 762.02 Prob > chi2 = 0.0000

Table 9. Average Partial Effects from pooled and dynamic random effect probit (based on estimated parameters in Table 8)

Variable	<i>Teenage mothers</i>		<i>Older mothers</i>	
	(1) pooled	(2) Heckman	(3) pooled	(4) Heckman
Lwfp	42.46***	21.89***	37.69***	12.81***
age	-1.11	-4.54*	-5.06**	-3.4*
divsep	17.67***	17.39***	39.76***	34.93***
wid	17.95*	19.14*	19.04***	16.63***
nvrmar	18.03***	25.45***	42.66***	38.09***
tcr04	-0.15	0.22	4.58***	4.02***
tcr514	1.37**	1.69*	3.29***	3.32***
tcr1524	-1.38*	-1.7	-4.39***	-2.1**
unideg	-8.1**	-9.88*	-4.21***	-6.95***
pstsch	-0.13	-0.49	0.01	-0.86
yr12	2.64	3.65	-0.99	-2.34**
aborig	5.53*	9.69*	1.65	5.21
good	-1.55	-2.72	0.43	-0.24
fair	7.24**	9.83**	2.2	1.25
poor	3.85	5.04	2.51	1.82
pertemp	-0.50**	-0.61**	-1.33***	-0.61***
pertuemp	0.02	0.05	0.22**	0.20**
mrbfnum	-2.23	-6.02**	-1.26	-5.51***
bnengc	-2.29	-2.66	1.37	2.64

Note: *** significant at 1%; ** significant at 5%; * significant at 10%.

For teenage mothers, having fair general health increases the probability of welfare participation by 10 percentage points relative to having excellent or very good general health. None of the health variables are significant for the older mothers.¹⁰ Ageing lowers the probability of welfare participation for both groups of mothers, but it is not very significant for teenage mothers after controlling for other characteristics.

The effects of the number of children and the level of highest education on teenage mothers' welfare participation are 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 10 percentage points for teenage mothers, and nearly 7 percentage points for older mothers.

¹⁰ 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 welfare participation.

As an informal check of the importance of the low education attainment of teenage mothers, both models were re-estimated 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.¹¹ For example, being a welfare recipient in the previous wave increases the probability of welfare participation in the current wave by just over 14 percentage points for this group of lower educated older mothers.¹² Education appears to be only a small part of the explanation.

5. Conclusions

This paper shows clear correlations between a range of characteristics and teenage motherhood. There are a number of individual and household characteristics that are associated with teenage motherhood. Overall the descriptive analysis indicates that teenage mothers are relatively disadvantaged when compared to the group of older mothers. Teenage mothers were more likely to have lived in a single-parent household in their childhood and to be of indigenous background. They were less likely to have had an employed father and/or mother when they were aged 14. Their current circumstances also look less favourable than those of older mothers. Teenage mothers are less likely to be partnered (and were less likely to be married at the time the first child was born), and they have on average more children. Finally, on a range of health measures (physical and mental), teenage mothers are considerably worse off than the older mothers.

Teenage mothers also have lower levels of education and tend to leave school early. Although there is a strong correlation between low education levels and teenage motherhood, it seems unlikely that teenage motherhood causes low education outcomes, given the timing of school leaving which is usually before the teenagers actually fall pregnant. Therefore, it seems more likely that common unobserved factors cause both teenage parenthood and low education outcomes. Comparing education levels across birth cohorts of teenage mothers, it is shown that their education outcomes have hardly

¹¹ 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.

¹² Full results are available from the authors.

improved over time, whereas comparing the same birth cohorts of older mothers a strong increase in educational attainment is observed.

In terms of labour market outcomes, teenage mothers are worse off as well. They are more likely to be unemployed or out of the labour force, as are the teenage mothers' partners for those who are partnered. However, if teenage mothers are working they are more likely to work longer hours. As a result of the low labour force participation, the teenage mother's own income and her partner's income are lower than for older mothers. It is therefore perhaps not surprising that teenage mothers' overall life satisfaction is somewhat lower than for older mothers.

The main question in this paper is how teenage motherhood affects welfare participation, and which teenage mothers are most likely to be on welfare at any given time. These results are then compared to the results for women who had their first child at an older age. From descriptive analyses, it is clear that teenage mothers are much more likely to participate in welfare than older mothers. They are particularly more likely to depend on Disability Support Pension. This may be related to the poor health outcomes evident from a comparison of a number of individual characteristics of teenage mothers to the characteristics of older mothers.

The multivariate analysis of welfare participation uses dynamic random effects probit modelling, in which the panel data features of the HILDA data are fully taken into account. These results are compared to a more simple pooled probit analysis, which does not take the panel feature of the data into account. We investigate whether the factors that determine welfare participation of women who experienced teenage motherhood differ from the factors that determine welfare participation of older mothers.

The dynamic random effects probit model indicates that accounting for unobserved individual-specific effects and for the endogeneity of the initial condition (that is, welfare participation in the first observed period) is important. In addition, there is a considerable degree of state dependence. That is, both models indicate that welfare participation in the previous period is extremely important in determining current welfare participation, and it is more important for teenage mothers than for older mothers.

Mothers who spent a larger proportion of time in paid work since 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. Education is important for both groups of mothers, but only a university degree decreases the probability of welfare participation significantly for teenage mothers. The probability of welfare participation decreases with age for both groups of women, although it is not quite significant for teenage mothers after controlling for other characteristics. Being divorced or separated or having never been married are important for both groups of women, with the effect being much larger for older mothers, possibly due to the higher “quality” of the partners of the older mothers.

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Appendix Table 1. Proportion of women who experienced teenage childbearing in the relevant current age group of all women

Current age	Proportion of teenage mothers in the relevant age group (%)
<=19	4.53
20-29	8.46
30-39	9.41
40-49	11.48
50-59	18.03
60<=	14.78
Total	10.98

Data source: Authors' own calculations based on the HILDA

Appendix Table 2. The percentages of women and female DSP recipients who reported to have specific types of long-term health condition (in waves 3 to 5)

Type of long-term condition (more than one can be selected)	<i>Teenage mothers</i>		<i>Older mothers</i>	
	All	DSP	All	DSP
Sight problems not corrected by glasses or lenses	5.98	8.33	5.31	6.27
Hearing problem	6.64	8.93	7.05	9.59
Speech problem	0.66	1.79	0.87	2.58
Blackouts, fits or loss of consciousness	4.32	8.33	2.55	9.59
Difficulty learning or understanding things	3.65	5.36	2.39	7.01
Limited use of arms or fingers	13.79	26.79	9.76	27.68
Difficulty gripping things	14.45	29.17	9.06	21.77
Limited use of feet or legs	15.45	29.76	12.20	29.52
A nervous or emotional condition which requires treatment	19.60	31.55	13.67	28.04
Any conditions that restricts physical activity or work (e.g. back problems, migraines)	38.04	50.60	34.65	47.23
Any disfigurement or deformity	1.16	3.57	2.22	6.27
Any mental illness which requires help or supervision	5.15	12.50	3.74	11.07
Shortness of breath or difficulty breathing	11.63	17.26	8.19	19.19
Chronic or recurring pain	26.08	38.10	22.45	40.59
Long-term effects as a results of a head injury, stroke or other brain damage	2.66	4.76	2.44	8.49
A long-term condition or ailment which is still restrictive even though it is being treated or medication being taken for it	26.91	41.07	22.83	44.65
Any other long-term condition such as arthritis, asthma, heart disease, Alzheimer's disease, dementia etc.	40.53	45.83	38.34	47.23
The number of observations in which a long-term health condition is reported from wave 3 to wave 5	602	168	1844	271
Total number of observations from wave 3 to wave 5	1741	189	8842	297

Data source: Authors' own calculations based on the HILDA

Note: These types of long-term conditions are not mutually exclusive.

Appendix Table 3. The number of different long-term health conditions for teenage and older mothers with and without DSP

<i>Number of long-term health conditions</i>	<i>Among mothers who have a long-term health condition</i>		<i>Among mothers who have a long-term health condition and who receive DSP</i>	
	Teenage mothers (%)	Older Mothers (%)	Teenage mothers (%)	Older Mothers (%)
1	47.51	58.41	19.05	23.62
2	21.10	18.87	23.21	18.08
3	11.96	9.00	14.29	14.39
4	6.48	5.10	14.29	10.33
5	4.32	3.52	8.93	9.96
More than 5	8.63	4.99	20.23	23.62
missing	-	0.11	-	-
Number of observations	602	1844	168	271