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Child care costs and the employment status of married Australian mothers

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ABSTRACT

Using data from the HILDA (Household Income and Labour Dynamics), this paper examines the implications of child care costs on maternal employment status by distinguishing between full-time and part-time work. Our empirical approach uses an ordered probit model taking into account the endogeneity associated with both wages and child care costs. Results indicate that child care costs have a statistically insignificant effect on the decision to work either full time or part time. Moreover, the reported elasticities of part-time and full-time work with respect to child care costs are relatively low. This suggests that the significant subsidies paid to users of child care may have a limited role in increasing the labour market activity of married mothers.

Keywords: female labour supply, child care, part-time, full-time
JEL-Code: (D13, J12, J13, J16)

I Introduction

Over the past decade or so, the relationship between maternal employment and the cost of child care has come under increasing scrutiny, particularly in Australia. Since a lack of affordable child care may adversely affect female labour force participation, child care policy is widely seen a means by which female labour market activity can be maintained and increased over the life cycle. The provision of subsidised child care therefore is seen as a policy that can encourage and provide opportunities for women to make the transition to paid employment following the birth of a child (Australian Government 2004, p. 1-15). This issue is intertwined with the policy challenge of funding an ageing population in the face of falling fertility levels. Despite increases in employment levels in Australia over the past three decades, women continue to fulfil the role of primary carers for children and the employment levels of women aged between 25 to 54 remains below that of a number of other OECD countries such as the United Kingdom, the United States and Canada (Jaumotte, 2004).

An important feature of employment patterns in Australia has been the increase in part-time employment both in absolute terms and relative to full-time employment (Australian Bureau of Statistics, 2001). Significantly, females occupy a disproportionately large share of part-time employment positions. In 2003-04, 15 per cent of employment for males consisted of part-time employment compared to over 45 per cent of female employment (Productivity Commission 2005, pp. 63-64). Similarly, although women constituted just 44% of the total workforce in 2002, 71% of all part-time workers were female (Australian Bureau of Statistics, 2003b). For females in particular, there is a pattern of large decreases in full-time employment offset, in part, by increasing part-time employment during the peak child bearing ages of 25 to 34 (Australian Bureau of Statistics, 2005). Further, women aged between 25 and 54 years of age accounted for almost half of all part-time workers in Australia (Australian Bureau of Statistics, 2001). Although there are a number of reasons for these patterns, it is clear that the tendency of women to combine work and child rearing activities during these years is an important consideration.

Interestingly, part-time employment among Australian women is its relatively high levels compared to females in other countries. For example, Drago *et al*. (2001) report that

whereas 5.6 percent of women in the United States were employed part-time in 1999, the figure was almost four times as high in Australia, or 23 percent of Australian women in May 2001. Furthermore, among employed women 28 per cent worked part-time in the U.S., compared to 44 per cent in Australia (p. 10). Similar patterns are observed for Canadian women, where approximately 28 per cent of all employed women worked part-time. Among women aged between 25 and 54 years around 21 per cent worked part-time. In comparison, approximately 42 per cent of Australian women in that age bracket were employed on a part-time basis (Statistics Canada 2003; ABS 2001). Moreover, in Canada full-time employment is more common than part-time employment for the married mothers of pre-school aged children (Michalopoulos and Robins, 2000).

In the light of these high levels of part-time employment among Australian women, it is important to examine how the cost of child care influences the employment decisions of Australian women, particularly on their decisions to work either full-time or part-time. Whereas the international literature on this point highlights the diverse labour supply responses (full-time and part-time employment) of mothers to changes in child care costs (Connelly and Kimmel, 2003; Powell, 1998; Michalopoulos, and Robins, 2000), the evidence for Australia on this issue is limited. In an early study of this issue, Teal (1992) argues that eliminating child care costs would not increase the tendency of women to work full-time rather than part-time (p. 252). Hence, the aim of this paper is to empirically model the effects of child care costs on the full-time and part-time work decision of married mothers. This paper presents new evidence on the relationship between child care costs and the probability of part-time and full-time work. Using the *Household, Income and Labour Dynamics in Australia* (HILDA) dataset, we consider the effect of child care costs on the decision to engage in full-time or part-time employment by married females with young children.[1]

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[1] This paper uses confidentialised unit record file from the Household, Income and Labour Dynamics in Australia (HILDA) survey. The HILDA Project was initiated and is funded by the Commonwealth Department of Family and Community Services (FaCS) and is managed by the Melbourne Institute of Applied Economic and Social Research (MIAESR). The findings and views reported in this paper, however, are those of the authors and should not be attributed to either FaCS or the MIAESR.

There are a number of reasons for focussing on the full-time part-time employment decision. First, it is likely that the labour market response of mothers to an increase in child care prices is not a complete withdrawal from the labour force, but rather an adjustment of hours of work according to the care needs of the child. Further, institutional constraints on the number of hours that an individual works may mean that choices over full-time and part-time employment are more relevant when considering the decision to engage in employment. Finally, given the high rate of part-time employment of women in Australia it is useful to consider how, if at all, employment decisions along this dimension are affected by the cost of child care. This issue is particularly relevant considering the ambiguity in the empirical literature, both Australian and international, over the impact that child care costs have on maternal employment.

Studies from both the United States and Canada (Blau and Robbins, 1988; Ribar, 1995; Powell, 2002; Michalopoulos and Robins, 2000, 2002), identify a negative relationship between child care costs and female labour market activity. It is important to stress, however that the range of elasticities reported for both participation in the labour force and hours of work with respect to child care costs remains wide. For example, estimates of the elasticity of participation in the labour market for married women in the United States ranges between -0.92 and 0.00. Doiron and Kalb (2005) provide a detailed overview of international evidence on this issue. In Australia also the evidence remains ambiguous. For example, Schofield and Polette (1998) find that child care subsidies can have a large impact on the net benefit of working for mothers. In the absence of subsidies, child care expenses can constitute up to two-thirds of after tax income. More recently, Doiron and Kalb (2002, 2005) find a negative relationship between child care costs and female employment. Although somewhat larger for lone parents and those women facing limited labour market opportunities in the form of low wages, the effect of child care costs on hours of work identified in Doiron and Kalb (2005) is relatively small. The elasticities in that study range from -0.02 to -0.22. Similarly, Rammohan and Whelan (2005) identify a small negative impact of child care costs on the labour market activity (participation and hours worked by those working) of married women.

Other studies such as those by Vandenheuvel (1996), Teal (1992) and Cobb-Clark *et al*. (2000), do not identify child care costs as a significant deterrent to maternal labour market

activity. Although the greatest demand for formal child care arises for work-related reasons, these studies indicate that the cost of child care is not a factor in restraining the use of child care and participation in the labour force by the mothers of young children.

The empirical strategy in this paper uses an ordered probit model with a trichotomous dependent variable capturing the labour market states of not-working, part-time and full-time employment. In the empirical analysis, we take into account the endogeneity associated with both wages and child care costs. Our estimation results show that child care costs have a statistically insignificant effect on the probability of full-time and part-time employment for married mothers of young children. Further, the elasticities of part-time and full-time work with respect to the cost of child care are low and consistent with those reported in Doiron and Kalb (2005). Such a finding is important in light of the substantial subsidies provided to working parents for child care related expenses. Moreover, given the desire of the Commonwealth government to increase lifetime labour force activity, the results of this paper provide some evidence on the limited efficacy of child care subsidies to induce greater labour market activity by married mothers with young children.

The remainder of the paper is organised as follows: the next section describes the model and econometric specification. Following this, we describe the dataset and summary statistics of the sample used in the analysis. The empirical results are presented in section 4, followed by conclusions in section 5.

II Model and Econometric Specification

The theoretical relationship between the cost of child care and female employment decisions has been examined in a number of papers including Connelly (1992) and Powell (1998). In those studies, a simple household optimisation model is used to motivate the estimation strategy and to identify the impact of a change in the price of child care (P_c) on the labour market activity of married females. The theoretical model assumes that a mother maximises utility over consumption goods, child quality and leisure. Child quality is modelled as a function of time spent in maternal child care and non-maternal care. The mother maximises utility by allocating her time between work, leisure and maternal child care activities subject to budget (time and money) constraints. Optimisation requires that both the net benefit of maternal child care and the marginal rate of substitution between leisure and consumption

be equated to the mother's wage. The net benefit of maternal child care depends on the relative benefits of maternal and non-maternal care in addition to the hourly expenditure on child care. Given that the quality of non-maternal child care depends on the hourly cost of care, the model predicts that a quality of care is chosen such that the marginal benefit of an increase in quality is equated with the marginal cost of an increase in care quality.

The theoretical model predicts that for those women who work, the market wage is equal to the shadow value of leisure time. Time is also allocated so that the wage is equated with the net benefit of time in parental care. One consequence of this is that changes that alter the cost of child care will in turn influence the optimal amount of time allocated to employment. For example, variation in household characteristics that change the cost of child care will also influence the probability and nature of employment. Hence, increases in child care costs associated with having an additional or younger children will tend to increase the cost of child care and make employment less likely. Conversely, the presence of another potential carer, such as older siblings or grandparents, will reduce the cost of care and make employment more likely. The model predicts that an increase in the wage rate increases the probability of employment and an increase in child care costs will decrease the likelihood of employment (Powell, 1997, pp. 579-80). The key question of interest in this paper is to identify the impact of a change in the price of child care (P_c) on the labour market activity, especially the choice of non-employment, part-time and full-time employment, of married females.

The empirical strategy adopted in this paper corresponds closely to that in Powell (1999) and Connelly and Kimmel (2003). The key equation of interest is the mother's decision variable, hours of work h. The desired hours of work (h) can be expressed as a function of the mother's wages (W) the cost of child care (P_c), a vector of observeable characteristics (A), and an error term (θ_h). Hence, h can be expressed as:

$$h = f(W,\ P_c,\ A, \theta_h) \tag{1}$$

where A includes household and demographic variables that may influence the mother's demand for leisure. Other determinants of maternal labour supply include non-labour (or

other household) income, and family characteristics that may influence the choice of child care and employment.

Previous research (Miller, 1993; Blank, 1989) has identified different sets of factors as being influential in the choice between part-time and full-time work. Furthermore as previously discussed, females, especially mothers of young children, are over-represented in part-time employment. If labour market activity is estimated using a binary choice model incorporating participation and non-participation only, this may give biased estimates of the effect of child care costs on employment decisions. It is possible, for example, that in response to an increase in child care costs, mothers are substituting out of full-time work into part-time employment. A dichotomous choice model in this case would not capture these effects as these women would still be regarded as being employed. Under these circumstances the ordered probit model is the appropriate model to use as the choice among full-time, part-time and no-work may be interpreted as having a natural ordering.

In the empirical analysis below we consider the impact of child costs on the choice of three employment states: to not work, work part-time (that is, working positive hours but less than 35 hours per week) or work full-time (35 hours or more per week). The choice of 35 hours used to classify employment as part-time or full-time is consistent with the approach adopted by the ABS for Australia (ABS 2005). Equation (1) may therefore be re-written as follows:

$$h^* = \beta_0 + \beta_1 w + \beta_2 p_c + \beta_3^{'} A + \mu_h \tag{2}$$

where the observed aspects of (2), labour force participation hours (LFP) are:

$$LFP = \begin{cases} 0 & if\ h^* \le \gamma_0 \\ 1 & if\ \gamma_0 \le h^* < \gamma_1 \\ 2 & if\ \gamma_1 \le h^* \end{cases} \tag{3}$$

where the first threshold $\gamma_0 = 0$ and the second threshold $\gamma_1 = 35$. Assuming that μ_h, the error term, is normally distributed with a normalised variance of 1, the appropriate model to use is an ordered probit with cut-off or threshold points of γ_0 and γ_1 (Greene 2003). This approach is consistent with an ordering whereby individuals increase hours of work from zero (not working) to part-time and full-time engagement in the labour force.

Prior to estimating equation (3), however, it is necessary to estimate a series of supporting equations since we only observe wages for those women that are in the work-force and child care costs for those women who actually report using care. The first of these supporting equations is a wage equation used to generate a predicted wage for all women in the sample, regardless of their labour force status. The approach used in this paper is a standard one in the labour supply literature, whereby a reduced form participation probit is first estimated across all women in the sample. The probit parameters from this participation equation are used to generate the inverse mills ratio to take into account the possibility of sample selection bias in the wage equation. The wage equation is estimated using the sample of workers only. The results of the wage equation are then used to generate values of the predicted wage $\left(\hat{W}\right)$ for all women in the sample, regardless of their labour force status.

The second supporting equation to be estimated is the hourly cost of child care which is defined as the total cost of care for all children per hour of work by the mother. In estimating the hourly cost of care, the sample selection issue is somewhat more complicated than that of the wage equation. In particular, it is necessary to take into account both the labour force participation decision of the woman as well as the use of paid care for her child(ren). Following Connelly (1992) and Powell (1997), a bivariate probit is first estimated where the dichotomous dependent variables reflect labour force participation, and the use of paid child care. The estimates from the bivariate probit can then be used to construct a single selection term for the cost of child care equation.[2] A cost of child care equation is then estimated by OLS over the sample of women who are observed to pay for child care with the inclusion of the sample selection term derived from the bivariate probit. Again, the estimates from the cost of child care equation are used to generate a predicted cost of child care $\left(\hat{P}_c\right)$ for all women in the sample regardless of whether they actually pay for child care. In estimating $\left(\hat{P}_c\right)$, we also take account of the probability that an individual actually pays for care. The product of the probability that an individual pays for care and the cost of care if purchased gives the predicted cost of care (Connelly 1992). In the final stage

[2] Details of the construction of the selection term can be found in Connelly (1992, p. 86) and Powell (1997, p. 582). Kimmel (1998) proposes an alternative approach whereby the estimated parameters

of the estimation procedure, the predicted wage $\left(\hat{W}\right)$ and the predicted cost of child care $\left(\hat{P}_c\right)$ are included in the structural ordered probit.

III Description of the Data

The data for this study comes from Wave 2 of the *Household, Income and Labour Dynamics in Australia* (HILDA) dataset, collected in 2002. The HILDA is a longitudinal dataset that provides information on the characteristics and behaviour of Australian households and their members over time. A key benefit of the HILDA dataset is its rich set of demographic and behavioural information, and for the purpose of this paper, extensive information on the labour market characteristics, and the type, extent and cost of child care services used by Australian households. This wave includes information on child care usage for both employment and non-employment purposes. Our sample is restricted to 1,138 married mothers with children under 15 years of age.

In HILDA, approximately 775,000 households or around 10 per cent of all households in Australia report using child care for employment related purposes. Of these, approximately 550,000 use child care for employment related purposes only and 225,000 use it for both employment and non-employment reasons. Over 1 million households report using child care for any purpose, that is, either employment and/or non-employment related purposes. Table 1 presents summary statistics for the sample used in the empirical analysis broken down by the labour market status of the mother.

A number of patterns consistent with *a priori* expectations emerge from our descriptive statistics (table 1). First, approximately one-half (48 per cent) of married women with children aged less than 15 report working. Among working mothers, part-time work dominates with approximately two-thirds working on a part-time basis. As expected, full-time workers tend to be older (38.6 years) than both non-workers (34.9 years) and part-time workers (37.8 years). This pattern is consistent with other demographic characteristics of the household. For example, 49 per cent of non-working mothers have a child aged less than

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from the bivariate probit are used to generate two selection terms used in the child care cost equation.

2 compared to 25 (16) per cent of mothers working part-time (full-time). Similarly, mothers working full-time are more likely to report having a child aged 10-14 in the household (79 per cent) compared to those mothers are not working (48 per cent).

In terms of education, the pattern follows *a priori* expectations. Women that report working full-time are more likely to be university graduates (35 per cent) compared to part-time (29 per cent) and non-working women (15 per cent). Such employment patterns are consistent with greater investment in human capital. It is noteworthy that the non-labour income is similar for both non-working mothers and those mothers working part-time. Not surprisingly, full-time workers have the highest weekly household income in the sample. Weekly household income for this sample is approximately $460 more than that for non-working women, and, slightly higher ($77) than women that report working part-time. However, interestingly, the hourly wage rates for full-time workers ($18.46) is slightly lower than that of part-time workers ($20.88). This could reflect a number of influences including the possibility that part-time workers include casual employees, for whom the higher hourly wage rate incorporates a range of employment related benefits available to full-time workers such as annual leave.

With regard to the ethnic characteristics of workers, we note that relative to non-workers and part-time workers, full-time workers are less likely to be Australian born. Such a pattern may reflect a number of considerations. For example, amongst migrant families it may be that a lack of skills or educational qualification leads to a greater need for women to engage in employment and thereby supplement household income.

It is interesting to note that among those mothers that work, around one-third report paying for child care, 32 per cent and 33 per cent respectively for part-time and full-time workers. Among workers using child care, the cost for child care per hour of employment is slightly higher for part-time workers ($1.91) compared to full-time workers ($1.61). Such a pattern may reflect the fixed costs associated with using formal child care arrangements and distribution of those fixed costs over fewer hours of employment. One other feature of the figures reported in table 1 is noteworthy. Among full-time (part-time) workers, only 56 per cent (65 per cent) report using child care for employment related reasons. This suggests that

a sizable proportion of households in with working mothers do not use child care at all. Earlier studies of child care in Australia have also identified this pattern, that

TABLE 1: Means of demographic and economic variables by mother's employment status

	Not working	Working part-time	Working full-time
Age (years)	34.83	37.76	38.66
State and location			
New South Wales	0.34	0.31	0.40
Victoria	0.25	0.26	0.24
Queensland	0.19	0.17	0.24
South Australia	0.07	0.09	0.05
West Australia	0.11	0.11	0.01
Tasmania, ACT and NT	0.04	0.07	0.06
Capital city	0.68	0.64	0.61
Inner regional	0.19	0.25	0.27
Outer regional	0.13	0.11	0.12
Ethnicity			
Australian born	0.72	0.77	0.66
Immigrant – English speaking	0.07	0.08	0.12
Immigrant – Non-English speaking	0.21	0.15	0.21
Education			
University	0.15	0.29	0.35
Post-secondary	0.35	0.37	0.30
Completed high school	0.16	0.13	0.18
Less than high school	0.35	0.21	0.18
Wage for workers ($ per hour)		20.88	18.46
Weekly household income ($)	1262	1647	1724
Average weekly hours for workers		20.06	42.28
Non-labour income ($)	1262	1269	957
Annual household disposable income ($)	48,837	63,202	67,667
Family/ household structure			
Child aged <2 present	0.49	0.25	0.16
Child aged 0 - 4 present	0.68	0.42	0.31
Child aged 5 - 9 present	0.44	0.48	0.44
Child aged 10 - 14 present	0.35	0.49	0.60
No. children aged 0 - 4	0.96	0.54	0.34
No. children aged 5 - 9	0.60	0.62	0.54
No. children aged 10 - 14	0.48	0.67	0.80
Healthy – absence work limiting disability	0.87	0.93	0.94
Use of child care			
Use CC for employment purposes	0.02	0.65	0.56
Use CC for employment purposes only	0.06	0.49	0.44
Use CC for emp. & non-emp. purposes	0.04	0.16	0.11
Use CC for non-employment purposes	0.31	0.22	0.16
Use CC for non-emp. purposes only	0.27	0.06	0.05
Use CC for either purposes	0.37	0.70	0.60
Do not use CC	0.63	0.29	0.40
Total weekly cost of child care for users ($)	-	39.60	65.26
Hourly cost of child care for users ($)	-	1.91	1.61

Pay for child care	0.00	0.32	0.33
Sample size	550	393	195

emphasises the ability of households to arrange employment so as to avoid the use of any child care arrangements (VandenHeuvel, 1996).

IV Empirical results

We now present the results of the empirical analysis, focusing first on the results from the preliminary equations which are set out in tables 3 and 4. In the first stage of the analysis, the equations used to estimate wages for all individuals in the sample are set out (table 3). We subsequently estimate a model of hourly cost of child care expenditures to identify the 'price' of child care per hour of employment for each individual in the sample (table 4). As in Connelly and Kimmel (2003), the cost of child care is estimated using a bi-variate selection correction to correct for only observing the cost of care for those mothers who are employed (selection 1) and who pay for care (selection 2).

Prior to considering those results, however, in table 2 we indicate the variables used in each of the estimating equations that lead to the structural ordered probit. This makes the identification process used in the estimation procedure clearer. In general, the included variables reflect the demographic and economic characteristics of the households to which the women belong, especially those that can potentially influence the use and cost of child care. For example, the first stage of the selection equation (the wage equation) includes variables indicating the presence and number of children. Conversely, the wage equation includes years of labour market experience. In the bivariate probit equation reported in table 4 (whether employed and whether pay for child care), the work status of the women's partner and the presence of another adult (other than the women's partner) is included in the specification. It is expected *a priori* that the presence of another adult will make it more likely that the woman is employed, and less likely she is required to pay for child care. In the cost of child care equation, the number of children in various age groups is included. Given the cost of child care is defined as the total cost per hour of work, it is expected that the higher numbers of children will be associated with a higher per hourly cost of care.

TABLE 2: Variables included in the estimation of full-time part-time employment model

	Wage equations		Cost of care equations		Ordered
	LFP	Wage	Bivariate probit	Cost CC	probit
Predicted wage ($\hat{W}$)					✓
Predicted cost child care ($\hat{P}_c$)					✓
Age (years)	✓	✓	✓	✓	
Age^2 (years)	✓	✓			
Experience (years)		✓			
Experience^2 (years)		✓			
Partner works reg. day shift			✓	✓	
University	✓	✓			
Post-secondary	✓	✓			
High school	✓	✓			
HS or less education					
New South Wales	✓	✓			✓
Victoria	✓	✓			✓
Queensland	✓	✓			✓
West Australia	✓	✓			✓
Immigrant – English speaking			✓	✓	
Immigrant – non-Eng. speak.			✓	✓	
Australian born					✓
Capital city	✓	✓	✓	✓	✓
Inner regional	✓	✓	✓	✓	✓
Presence of other adult in HH			✓	✓	
Child aged < 2 present	✓		✓	✓	
Presence child 0 – 4 years					
Presence child 5 - 14 yrs			✓		
# children aged 0 - 4 yrs	✓		✓	✓	✓
# children aged 5 - 9 yrs	✓			✓	✓
# children aged 10 - 14 yrs	✓			✓	✓
Absence health condition	✓	✓			✓
Non-labour income	✓		✓	✓	✓
Constant	✓	✓	✓	✓	

The variables included in each equation have been chosen conservatively and keeping in mind that the empirical results can be sensitive to the choices made (see for example Kimmel 1998). Nonetheless, alternative specifications indicate that the results presented below are robust to the choice of included and excluded variables in each of the equations.

In table 3, we present the results of the estimation associated with the equations used to predict the wage rate for all individuals in the sample. The results are generally consistent with those found in the labour supply literature. For the selection or labour force participation equation, education has a positive and significant effect on the likelihood that a

married woman is observed to be working. Conversely, the presence of young children (especially under 2 years of age and the number of children aged less than 4 years) significantly reduces the likelihood that an individual is observed to be in the labour force. More generally, the number of children of various age groups also has a negative and significant impact on labour force participation. This is consistent with previous findings where better educated women are more likely to work, but the presence of young children reduces the probability of being employed.

Further, an increase in non labour income tends to reduce the probability of labour force participation. Recall that non-labour income includes the income of the woman's partner. The wage equation also shows familiar patterns. The wage increases at a decreasing rate with years of experience and education levels. Other variables relating to household structure do not have an impact on the wage rate of the woman. The selection term or inverse mills ratio (lambda) is positive and significant indicating that workers are positively selected into employment and exhibit higher wages compared to non-workers. That is, in general the women observed to be working are those that would earn higher wages relative to non-workers.

The results of the bivariate probit are set out in columns 2 and 3 of table 4. With respect to the pay for child care equation (column 2), being an immigrant from an English speaking country increases the likelihood that the woman pays for child care, whereas being an immigrant from a non-English speaking country has no impact on paying for care. Recall that Australian born mothers are the reference group in this case. Hence, it is possible that this result reflects the lack of availability of social networks for English speaking immigrants, especially family, that increase their need to rely on purchased child care services. Conversely, cultural considerations may mean that non-English speaking immigrants do not rely on paid child care.

TABLE 3: Reduced form LFP probit and log wage coefficient

Variable	Selection equation	Log wage equation
Age	0.1915***	0.04117
	(0.0498)	(0.0299)
Age^2	-0.0024***	-0.0004
	(0.0007)	(0.0004)
Experience		0.0258**
		(0.0113)
$Experience^2$		-0.0007**
		(0.0003)
University	0.9727***	0.5463***
	(0.1201)	(0.0511)
Post-secondary	0.4945***	0.2016***
	(0.1033)	(0.0462)
High school	0.4309***	0.2208***
	(0.1301)	(0.0566)
New South Wales	0.0060	0.0798
	(0.1300)	(0.0504)
Victoria	0.0053	0.0167
	(0.1356)	(0.0522)
Queensland	0.0191	0.0271
	(0.1384)	(0.0531)
West Australia	-0.2608	-0.0799
	(0.1781)	(0.0752)
Capital city	-0.1495	0.0047
	(0.1246)	(0.0495)
Inner regional	0.1036	0.0119
	(0.1356)	(0.0534)
Child < 2 present	-0.3226***	
	(0.1232)	
No. children aged 0 - 4	-0.4673***	
	(0.0791)	
No. children aged 5 - 9	-0.1881***	
	(0.0588)	
No. children aged 10 - 14	-0.1043**	
	(0.0615)	
Absence long term health condition	0.6690***	0.0141
	(0.1348)	(0.0621)
Non labour income ($'000 per week)	-0.1927***	
	(0.0451)	
Constant	-3.789***	1.322**
	(0.9305)	(0.5469)
Lambda (IMR)	0.1684***	
	(0.0489)	
Log likelihood	-905.1818	
Observations	1,138	

Notes: standard errors are in brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels.

The presence of an older child and being an older mother is associated with a lower probability of paying for care. This result most likely reflects the significantly lower level of

supervision required for older children. Similarly, the bivariate probit results from the labour force participation estimation shows that household characteristics such as non-labour income and the presence of an adult other than the husband, significantly reduces labour force participation. While it is not surprising that an increase in non-labour income reduces labour force participation of mothers, the result with regard to the presence of another adult is ambiguous. For example, evidence from the United States research (see Wolf and Soldo, 1994; Ettner, 1995) suggests that female labour supply is adversely affected by the presence of older individuals in the household. One possible reason is that the other adult is an older parent requiring care which in turn reduces the likelihood that the mother is observed working.

The results from the bivariate probit also indicate that the error terms for the labour force participation and pay for care equations are positively correlated, with the correlation coefficient (*rho*) being positive and statistically significant. This suggests that positive monetary cost child care is more likely to be observed among working mothers. This result is in contrast to that found in similar studies for Canada and the United States (Connelly 1992; Powell 1997) and indicates that in the sample used, unobservable characteristics that determine labour force participation are positively correlated with unobservable characteristics that influence the 'pay for care' decision.

The final set of results presented in table 3 are those associated with the selection corrected child care cost equation (column 4). Note that this equation is estimated only for those women that report paying a positive amount for employment related child care. Again, these results are generally consistent with *a priori* expectations. For example, having additional young children (aged less than 4) is associated with higher hourly costs of child care. It is noteworthy too that non-labour income is positively related to the hourly cost of child care, possibly reflecting a preference for higher quality care among those households with higher incomes.

The final result of note in the hourly cost of care equation is the selection term (lambda). Recall that this selection term was constructed using the results from the bivariate probit in

Table 4: Bivariate probit and cost of child care equations

	Bivariate probit coefficients		Cost of care equation (4)
	Pay for care (2)	LFP (3)	
Age	-0.0152*	0.0245***	0.1116*
	(0.0087)	(0.0071)	(0.0530)
Child < 2 present	-0.2547*	-0.2861**	1.5702
	(0.1451)	(0.1308)	(3.3680)
Presence child aged 5-14	-0.1828*	-0.1923	
	(0.1330)	(0.1203)	
No. children aged 0 – 4	0.0635	-0.2986***	2.3961***
	(0.0836)	(0.0756)	(0.3848)
No. of children aged 5-9			0.7769**
			(0.3373)
No. of children aged 10-14			-0.5803
			(0.3671)
Presence of adult other than husband	-0.3974**	-0.3649***	-1.4845
	(0.1877)	(0.1370)	(1.3648)
Immigrant – English speaking	0.3850***	0.0579	-1.4990
	(0.1458)	(0.1377)	(0.9842)
Immigrant – non-Eng. speaking	-0.1094	-0.2425**	0.5154
	(0.1308)	(0.1110)	(0.6674)
Partner works reg. day shift	0.2338**	0.2904***	-0.9530
	(0.0976)	(0.0834)	(0.6395)
Capital city	0.2073	0.0907	0.6568
	(0.1416)	(0.1180)	(0.7775)
Inner-regional	0.0890	0.1526	-0.0599
	(0.1537)	(0.1281)	(0.7427)
Non labour income ($'000 per week)	-0.0781	-0.1396***	1.4919***
	(0.0487)	(0.0438)	(0.3067)
Constant	-0.4686	-0.4659	1.6432
	(0.3492)	(0.2941)	(3.3481)
rho	0.9691***		
	(0.0285)		
lambda (selection correction term)			-4.2000
			(2.5820)
Log likelihood	-1041.6459		
R^2			0.35
No. observations	1,138		190

Notes: standard errors are in brackets. ***, ** and * indicate significance at the 1%, 5% and 10% levels.

the manner described in Connelly (1992). The negative coefficient on this selection term suggests that the amount one pays for care amongst those who pay is affected by 'negative' selection into the group of those who pay for child care, albeit in an insignificant manner. This result is consistent with those reported in other studies such as Connelly (1992) and Powell (1997), and implies that among women who are observed to pay for child care, the hourly cost of care is lower than for those women not observed to be paying for care.

The results from the structural ordered probit model, incorporating predicted costs of child care and predicted wages are set out in table 5 below. The results reported in table 5 generally correspond with *a priori* expectations. For example, we find that an increase in the number of younger children (those aged less than 4 and those aged 5 to 9 years) has a significantly negative effect on the probability of the mother working either full-time or part-time. Similarly, an increase in non-labour income also has a negative and significant effect on both full-time and part-time participation. In terms of regional effects, the state the individual is located in or the geographical remoteness of the individual's location does not have any significant effects on mother's work status.

As noted above, we find that despite controlling for child care costs, an increase in the number of young children under four years of age significantly reduces the probability of the mother working either full-time or part-time. This result is consistent with *a priori* expectations, as the mother is most likely to limit participation in the workforce in the years immediately following the birth of a child. In the estimations we have assumed that the fertility decision, especially the timing of births, is endogenous. A useful question that could be addressed with additional data is the relationship between the number and timing of birth of the children, and the labour force activity of the mother. For example, it is likely that the number and timing of births is chosen in conjunction with the employment decisions of mothers. It is also of note that the negative effect of the presence of young children is lower for full-time compared to part-time work. This result is contrary to a similar study by Powell (1998), where she finds that in Canada after controlling for child care costs, the presence of young children does not significantly affect the probability of the mother working.

Table 5: Estimation results from the ordered probit model

Variables	Probit coefficients	Marginal effects		
	Coefficient	Not working	Working PT	Working FT
$\hat{W}$	1.8500*** (0.1572)	-0.7376*** (0.0628)	0.3897*** (0.0449)	0.3479*** (0.0321)
$\hat{P}_c$	-0.0477 (0.05274)	0.0190 (0.0210)	-0.0100 (0.0111)	-0.0090 (0.0010)
NSW	0.0222 (0.1096)	0.0089 (0.0437)	0.0047 (0.0229)	0.0042 (0.0209)
Victoria	0.0449 (0.1133)	0.0179 (0.0451)	0.0093 (0.0232)	0.0085 (0.0219)
Queensland	0.0893 (0.1172)	0.0355 (0.0466)	0.0182 (0.0231)	0.0173 (0.0235)
West. Aust.	-0.1089 (0.1522)	0.0434 (0.0602)	-0.0241 (0.0351)	-0.0193 (0.0256)
Inner-regional	0.1185 (0.1014)	-0.0471 (0.0402)	0.0240 (0.0198)	0.0231 (0.0205)
Outer-regional	0.1434 (0.1273)	-0.5694 (0.0502)	0.0283 (0.0233)	0.0287 (0.0270)
Australian born	0.0668 (0.0938)	-0.0266 (0.0372)	0.0143 (0.0205)	0.0123 (0.0168)
No. children aged 0-4	-0.4275*** (0.1352)	0.1704*** (0.0539)	-0.0900*** (0.0296)	-0.0804*** (0.0253)
No. children aged 5-9	-0.1520*** (0.0607)	0.0606** (0.0242)	-0.0320* (0.0130)	-0.0286** (0.0115)
No. children aged 10-14	-0.0749 (0.0596)	0.0298 (0.0237)	-0.0158** (0.0126)	-0.0141 (0.0112)
Healthy	0.5336*** (0.1320)	-0.2072*** (0.0482)	0.1304*** (0.0356)	0.0769*** (0.0142)
Non labour income	-0.2116*** (0.0715)	0.0843*** (0.0285)	-0.0446*** (0.0154)	-0.0398*** (0.0136)
Pseudo R^2	0.1366			
Log likelihood	-991.75665			
No. of observations	1,138			

***,**,* denotes significance at the 1, 5 and 10 per cent levels respectively. Standard errors are in parantheses. Marginal effects are evaluated at the sample mean.

Of central interest in the present analysis is the effect of wages and child care costs on the part-time and full-time decision. Our estimation results indicate that an increase in the wage

rate has a positive and significant effect on mother's employment status, both full-time and part-time. Interestingly, an increase in the wage rate has a larger impact on the probability of part time employment compared to full-time employment. This is confirmed in table 6 where the elasticities for part-time and full-time employment with respect to the wage rate are 1.04 and 0.93, respectively.

In a recent review article Birch (2005) reports a range of labour force participation elasticities for Australian women with respect to their own wage. The results reported in table 6 fall within the range of elasticities reported by Birch (2005). At the same time, the part-time elasticities we report are somewhat higher than those reported in similar studies for Canada (Powell, 1998) and the United States (Connelly and Kimmel, 2003). Recall, however, that part-time employment is a more common employment arrangement for women in Australia compared to women in those countries. The results may reflect the significant differences in the underlying tax and transfer programs between Australia and other countries, and the influence that wages have on the female employment arrangements.

One of the key aims of this study is to examine the relationship between the cost of child care and the part-time versus full-time employment decisions of mothers. In the specification reported in table 5, we find that the predicted cost of child care has no influence on maternal employment status. The elasticities implied by the coefficients on $\hat{P}_c$ reported in table 5 imply an elasticity of part-time (full-time) employment with respect to the cost of child care of -0.06 (-0.21) (table 6). Nonetheless, our results suggest that lower child care costs do not have a statistically significant effect on the likelihood that women will be working, either full-time or part time. Moreover, disregarding the statistical significance of the estimated coefficient, it is also the case that the impact of lower child care costs is small and arguably economically insignificant.

Table 6: Estimated elasticities of employment with respect to child care costs and wage

Employment status	Child care costs	Wage
Working part-time	-0.0649	1.0460***
Working full-time	-0.2124	0.9340***

The elasticities reported in this paper are somewhat lower than those reported for the United States and Canada, in studies by Connelly and Kimmel (2003) and Powell (1998),

respectively. Additionally, in those studies the estimated coefficient on the cost of child care variable was statistically significant. Using a somewhat different specification to that adopted in this study, Michalopoulos and Robins (2000) find that an increase in the cost of child care would decrease full-time employment but increase part-time employment in the United States and Canada.

Our results are consistent with a number of previous studies of the effect of child care cost on labour market activity for Australian women. For example, using the HILDA dataset, Rammohan and Whelan (2005) report an elasticity for labour force participation with respect to the cost of child care of -0.12. Similarly, Doiron and Kalb (2005) report low elasticities for the labour force participation of married females with respect to child care costs of -0.02. Although the results in the study by Doiron and Kalb (2005) suggest somewhat greater elasticities for certain groups such as those with low wages and or pre-school aged children, it remains the case that for Australian women in general, the labour market response to changes in the cost of child care is muted.

To test the robustness of the results in this paper, the analysis was replicated using only those mothers with preschool aged children. The results in those cases were similar to those reported above for mothers with children aged less than 15 though the response of employment to the cost of child care was somewhat higher. In that case, the elasticities of part-time (full-time) employment with respect to the cost of child care being -0.40 (-0.93). Again, however, the coefficient on the predicted cost of child care was not significant at the 10 per cent level.

The analysis in this paper suggest that policies designed to increase female labour force participation by reducing the cost of child care, either by direct subsidies to users or subsidies to providers of child care, are likely to be met with limited success. This finding is consistent with the earlier studies that have asked women attitudinal questions such as whether the cost of child care was the reason formal care arrangements were not used (VanDenHeuvel 1996; Cobb-Clark *et al*. 2000).

V Conclusions

This paper uses data from the HILDA to examine the impact of child care costs on maternal employment status in Australia. An important contribution of this study is that we explicitly model maternal work status by distinguishing between part-time and full-time employment. This is an important distinction in Australia particularly, where rates of part-time employment among women in the peak child caring ages of 25 to 54 are high relative to comparable countries. Our estimation results show that while Australian mothers respond to an increase in wages by increasing both their full-time and part-time participation, an increase in the number of young children (particularly under 4 years of age), and an increase in non-labour income increase the likelihood of the mother not working. These results are not surprising and in keeping with much of the previous literature. We also find that the wage elasticity of employment status is greater for part-time working mothers, relative to full-time. Whether this result reflects the tax and transfer policies in Australia and their impact on secondary earners in the household is a research question that may be more fully explored in the future. Given the desire of policy makers to maintain labour force participation of individuals over the course of their working lives, variation in part-time and full-time status may have important policy implications in the context of an ageing population. It is possible, for example, that part-time employment may result in greater human capital depreciation than would occur in full-time employment if career opportunities are more limited for the former set of workers. In turn, part-time employment may limit lifetime labour supply over and above that associated with the temporary reduction in hours during those years when child rearing is highest.

Our estimation results show that child care costs have a statistically insignificant and small, negative marginal impact on both the decision to work part-time and the decision to work full-time. From a policy perspective, the results here are relevant to ongoing debates about the impact that child care costs have on maternal employment decisions and the role that child care subsidies may play in enhancing labour market activity. The analysis in this paper suggests that increases in the subsidies available to parents who use child care is unlikely to lead to large increases in employment activity.

It should be noted that the study has a number of limitations which warrant additional analysis. For example, throughout the analysis we have assumed that child care is available

to individuals to use if they wish to do so. Anecdotal evidence would suggest that this is not always the case, and that extending the analysis in this paper to incorporate measures of the availability of child care services (supply side considerations) would be a useful extension of the methodology set out in this paper. At present, limits on data availability mean that such analysis is beyond the scope of this paper.

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