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The Impact of Child Care Costs on Female Labour Supply: Evidence from Canada

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Abstract

This paper provides estimates for Canada of the impact of child care costs on female labour supply. This is done by linking two Statistics Canada microdata sources. Specifically, the data used in this paper are from the 1988 National Child Care Survey and the 1988 Monthly (September) Labour Force Survey.

The paper provides child care price elasticities for labour force participation for married women and compares the results with those found by U.S. researchers. The paper also provides labour supply elasticities incorporating the effects of child care costs.

The results show that the market wage has a significant positive impact on both the mother's labour force participation decision and her hours of work supplied. Child care costs are found to have a significant negative impact on hours of work conditional upon employment and a negative but insignificant impact on labour force participation.

1 Introduction

The policy debate regarding the subsidization of child care in Canada has evolved steadily and has intensified considerably in recent years at both the federal and provincial levels. Several policy prescriptions including both demand-side and supply-side subsidies and tax adjustments have been proposed and a variety of objectives such as increasing the labour force participation of women, promoting the well-being of children, and increasing fertility rates, have been posited by various participants in the debate.[1] In fact, the child care issue has been at the top of the social policy platform in the three previous federal elections. However, the policy debate remains unresolved. The groundswell of interest and concern associated with child care parallels the basic demographic, economic, and social changes that have occurred in Canadian society over the past several decades. Fertility rates across Canada have more than halved since the early 1960s (Statistics Canada, 1992). Single parent families are now much more prevalent (Special Committee on Child Care, 1987). And, the role of women in society has changed dramatically, with marked increases in female labour force participation; even the participation rate of women with pre-school aged children (3-5 years) has climbed over sixty percent (Statistics Canada, 1993). It is the changes in the labour force participation of women that provides the motivation for this study.

Female labour supply in Canada has been studied extensively by economists such as Nakamura and Nakamura (1985, 1992). However, economists have only recently begun to include the cost of child care in their study of female labour supply, in part, because of a lack of data on child care costs. The empirical work that exists to date in North America comes from the United States. Indeed, the results of such studies have obvious implications for the potential of child care policy in influencing the labour supply decisions of women. It should be noted, however, that despite the lack of Canadian empirical work incorporating child care costs, the economics of child care has been analyzed in Canada for over twenty years (Krashinsky, 1977).

This paper provides estimates for the first time in Canada of the impact of child care costs on female labour supply. This is done by linking two Canadian data sources. Specifically, this paper uses microdata from the 1988 National Child Care Survey and the 1988 Monthly (September) Labour Force Survey.

Studies in the U.S. have analyzed the impact of child care costs on the labour force participation decision and the joint labour supply and utilization of care decisions of women. In a pioneering study, Heckman (1974) overcame the absence of data on actual daycare expenditures by comparing the relative cost of formal care to the potential availability of

[1] A full framework for child care policy analysis in Canada can be found in Powell (1992).

low- or no-cost daycare from relatives within a family. He found a significant negative effect of daycare costs on the labour force participation of married women. Blau and Robins (1988) also found significant negative effects of daycare costs on the labour force participation of married women. They used regional site averages of nonzero values of weekly child care expenditures as a measure of child care costs for each family in the site and reported a child care price elasticity of -.38 on the participation rate.

Connelly (1992) was the first researcher to incorporate household specific information in the estimation of the price of child care. She found statistically significant negative effects of daycare costs on the labour supply of married women and she reported the price of child care elasticity for participation to be -.20. Connelly (1990) examined the impact of child care costs on unmarried mothers. The results with respect to labour force participation were again negative and significant but of a higher magnitude than those for married women.

Michalopoulos, Robins, and Garfinkel (1992) specify and estimate a structural model in which the decision to purchase market child care is made simultaneously with the participation decision of the mother. The structural estimates are used to simulate the effects of a refundable child care tax credit on the distribution of benefits and on the expenditure on market care. While they do not provide an elasticity measure for labour force participation with respect to child care costs, they do report the elasticity of hours of work with respect to child care subsidy rates to be 0.0018.

Ribar (1992) and Kimmel (1992) have both implemented reduced form models to estimate the impact of child care costs on employment behaviour and the utilization of both paid and unpaid child care. Both papers show that increases in the price of child care significantly reduce the probability of labour force participation and the use of paid child care. Ribar reports a child care price elasticity for participation for married mothers of -0.74. Kimmel reports this elasticity measure for both married and unmarried mothers to be -0.30 and -0.52, respectively. The results obtained by Ribar remain significantly larger than what other researchers have found.

Averett, Peters, and Waldman (1992) introduce a nonlinear budget set into the child care literature using a wage measure net of child care costs and the child care tax credit to explore the impact of the child care tax credit in the U.S. income tax system on female labour supply. Their results show that increasing the value (percent of expenditures subsidized) of the child care tax credit will increase hours supplied to the labour market by married women with children under age six. They also report an elasticity of labour supply with respect to the cost of formal child care of -0.52.

This paper provides structural child care price elasticities for labour force participation for Canada and compares these results with the U.S. results. The paper also provides structural

labour supply elasticities for married women in Canada incorporating the effects of child care costs. Connelly (1992) provides the analytical basis for the empirical approach in this paper. The remainder of the paper is structured as follows. Section 2 outlines the theoretical model. Section 3 discusses the econometric specification and estimation procedure issues. The data sources and summary statistics are discussed in Section 4. Section 5 presents the empirical results. Section 6 concludes the paper.

2 Theoretical Model of Labour Supply and Child-Care Costs

The following model is based on the analytical framework outlined by Connelly (1992). It is assumed that the mother is married with the spouse present in the household and that there exists at least one child under the age of thirteen.[2] Further, it is assumed that the mother holds the responsibility as the primary child care giver.

The mother is assumed to maximize the individualistic utility function

$$U = U(X, Q, L) \tag{1}$$

where X represents a composite market good, L is the mother's leisure, and Q is quality of child care. Child care quality depends positively on the average amount of time the children spend in the care of their mother, C_m , and the average amount of time spent in non-maternal child care, C_n . Let Q_1 and Q_2 represent the productivity measure of maternal care and non-maternal child care services, respectively. Thus, average total quality of care over N children in the household can be written as

$$Q = Q_1 C_m + Q_2 C_n \tag{2}$$

where N is taken as exogenous.

The mother's maximization problem is subject to three constraints. The budget constraint is given by:

$$X + P_c C_n = WH + Y \tag{3}$$

where P_c is the total hourly cost of non-maternal child care over N children, W is the wage

[2]It is assumed that children 13 years and older require very little child care as they are in school most of the day. In fact, they may begin to become child care providers by way of babysitting.

rate of the mother, H is the number of hours worked by the mother, and Y is family income[3] other than the mother's own earnings. The price of the composite good has been normalized to one.

Time constraints are imposed both on the mother and the children such that:

$$H + C_m + L = 1 \tag{4}$$

$$C_m + C_n \quad = 1 \tag{5}$$

where the mother allocates her time between hours worked in the market, leisure, and child care and the child's time is divided between care at home and non-maternal care.

Maximizing the mother's utility function with respect to L, X, C_m, and C_n subject to the three constraints yields a set of first-order conditions which can be solved for an assumed interior solution which predicts that the mother will participate in the market according to:

$$\frac{U_L}{U_X} = W = \frac{U_Q}{U_X}(Q_1 - Q_2) + P_c \tag{6}$$

where the marginal rate of substitution between goods and leisure will equal the wage which in turn will equal the net benefit of maternal child care. As with traditional labour supply models, from the first-order conditions with respect to X and L the model predicts that women participating in the labour market equate the market wage to the shadow value of time spent in leisure. However, as described by Connelly (1992), the model also predicts that the mother will substitute between maternal and non-maternal child care until her wage is equal to the net benefit of maternal care. Thus, an increase in the wage of the mother is expected to increase the probability of employment, while an increase in the cost of child care is expected to lower the probability of employment. Variables such as the number and ages of children in the family, the presence of alternative caregivers in the household available to provide low cost care, and the degree of government child care subsidies will all affect the cost of care and hence the probability of participating and the amount of labour supplied by the mother.

3 Econometric Specification and Estimation Issues

From the utility maximization problem outlined above a structural solution for the hours of work decision variable H can be expressed as a function of the wife's wages, the price of

[3]The spouse's labour supply decision is assumed to be exogenous in this model.

child care, other observed determinants, and unobserved determinants. Let H be denoted by

$$H = h(W, P_c, A, \epsilon_h) \tag{7}$$

where W and P_c are defined as before, A is a vector of observed determinants, and ϵ_h represents unobserved determinants. The vector A includes variables such as household and regional characteristics and variables relating to the mother's demand for leisure. Because both the categorical labour force participation (LFP) decision and the continuous labour supply decision are estimated, the two final structural equations include equation (7) specified with a 0-1 dependent variable (denoted by LFP) and the continuous dependent variable H. The LFP equation is estimated via the probit procedure and a Heckit-type procedure is used to estimate the continuous labour supply equation. Rewriting equation (7), the structural equations are specified as follows:

$$H^\star = \beta_0 W + \beta_1 P_c + \beta_3' A + \epsilon_h \tag{8}$$

where

$$\text{LFP} = \begin{cases} 1 & \text{if } H^\star > 0 \\ 0 & \text{otherwise} \end{cases} \tag{9}$$

$$H = \begin{cases} H^\star & \text{if } H^\star > 0 \\ 0 & \text{otherwise} \end{cases} \tag{10}$$

Before we can estimate either the labour force participation decision equation (9) or the labour supply equation (10), there are two supporting equations to be estimated. First, a wage equation is estimated to produce a wage measure for all women regardless of labour force participation status. Second, the price of child care is estimated in order to produce a supporting equation for the price of child care for all women, those not participating in the labour force, as well as those working women not paying for child care. [4]

Let the wage equation be specified as follows

$$\ln W = \gamma' M + v_w \tag{11}$$

where M represents a vector of observed determinants and v_w represents unobserved variation. The vector M includes variables to account for age, education, regional variation, and intermittent work history. In the estimation of equation (11) standard techniques are

[4]The estimation in this paper is performed using the econometrics package LIMDEP Version 6.0.

used to correct for the labour force participation selection bias by including a Heckit-type correction term (inverse Mills ratio) as a regressor. The inverse Mills ratio is calculated from the results of a reduced form labour participation probit.

The second supporting equation to be estimated is the total hourly price of child care which is defined as the total cost of care over all children per hour worked by the mother. Let the child care price equation be

$$P_c = \alpha' D + v_p \tag{12}$$

where D is a vector of observed determinants and v_p represents unobserved variation. It is assumed that the price of child care will vary according to family characteristics. Both the number and ages of the children in the family are expected to affect child care expenditures with younger children costing more. The presence of alternative caregivers in the household, the flexibility of the husband's hours of work, and the immigrant status of the mother are expected to affect the availability of low-cost care and hence expenditures. The size of the area of residence of the household is also expected to impact on the prices faced by parents.

The appropriate selection correction for the child care price equation is more complicated than that of the wage equation because the selection is the result of two decisions: the use of paid care decision and the labour force participation decision.

To correct for this selection bias, let the reduced form paid care and participation equations be

$$z_1 = \gamma_1' x_1 + \epsilon_1 \tag{13}$$

$$z_2 = \gamma_2' x_2 + \epsilon_2 \tag{14}$$

where $z_2 > 0$ if the mother works and $z_1 > 0$ if she works and pays for child care. It is assumed that ϵ_1 and ϵ_2 are distributed normally with zero means, unit variances, and correlation coefficient ρ.

Following Maddala (1983, p. 368), the joint selection bias has the form

$$E\left(v_p | \gamma_1' x_1 > \epsilon_1, \gamma_2' x_2 > \epsilon_2\right) = \phi(h_1)\left[1 - \Phi(h_2^\star)\right] + \rho\phi(h_2)\left[1 - \Phi(h_1^\star)\right] F(h_1, h_2, \rho) \tag{15}$$

where

$$h_1 = \gamma_1' x_1$$

$$h_2 = \gamma_2' x_2$$

$$h_1^\star = \frac{h_1 - \rho h_2}{(1-\rho^2)^{1/2}}$$
$$h_2^\star = \frac{h_2 - \rho h_1}{(1-\rho^2)^{1/2}}$$

and where ϕ and Φ are the standard normal density and distribution functions and F is the bivariate normal distribution function. Estimating a bivariate probit model with sample selection[5] yields consistent parameter estimates for the vectors γ_1 and γ_2 and of ρ.

The following recaps the procedure taken to estimate the supporting equations. First, a reduced form labour force participation probit is estimated to create a selection term (inverse Mills ratio) to correct for sample selection bias in the wage equation. Next, a reduced form pay for care and labour force participation bivariate probit model[6] is estimated in order to produce a selection correction term for the child care price equation.[7] Finally, the wage and child care expenditure equations are estimated by OLS[8] with the appropriate correction for their respective selection biases.

After the wage and price of child care equations have been estimated, both the predicted wage and child care price estimates are then included in the structural labour force participation equation and the structural labour supply equation. The structural labour force participation equation is estimated using the probit procedure. The structural labour supply equation[9] is estimated by the Heckit-type procedure. The Heckit-type estimation procedure for the structural labour supply equation uses information only for those women with positive hours of work and accounts for the labour force participation selection bias in the same fashion as in the wage equation by adding the inverse Mills ratio regressor (Mroz, 1987; Maddala, 1983).

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[5]The log-likelihood for the bivariate probit model with selection is equal to

$$\sum_{z_1=1,z_2=1} \ln F(\gamma_1' x_1, \gamma_2' x_2, \rho) + \sum_{z_1=0,z_2=1} \ln F(-\gamma_1' x_1, \gamma_2' x_2, \rho) + \sum_{z_2=0} \ln \phi(-\gamma_2' x_2)$$

[6]Univariate probit coefficient estimates are used as starting values in the bivariate probit model.

[7]Within the child care literature, it has been noted that the advantage of the proposed two stage procedure over a full maximum likelihood estimate of the tobit equation is that it allows the coefficients that determine whether someone pays for care to differ from the coefficients that determine the amount paid for child care by those who are paying.

[8]The standard errors are corrected for heteroskedasticity using White's heteroskedasticity consistent covariance estimator.

[9]See note 8 above.

4 The Pooled Data Set and Estimation Sample

The primary data source for this paper is the 1988 Canadian National Child Care Survey (CNCCS).[10] The CNCCS was administered as a supplement to the 1988 Monthly (September) Labour Force Survey (LFS). Child care information and demographic and economic variables are available for a "reference week" during the interview period. While the CNCCS provides comprehensive data on child care and family characteristics, it does not provide relevant information on wages. However, since the sample frame of the CNCCS overlaps one of the LFS rotations, corresponding wage data were obtained from the LFS. As a result, the hourly wage data were linked to the CNCCS according to the household identification numbers. This linkage creates the first complete data set in Canada for the study of the impact of child care costs on female labour supply.

In terms of the economic data available from the CNCCS, while the linkage of the CNCCS and the LFS provided wage data, data on unearned income are still incomplete.[11] As a result, the mother's unearned income is proxied by her spouse's total income (using dummy variables for the income categories).

Actual reported hours of work for the working mothers are available for the reference week. Hourly wages, as discussed earlier, are defined by the LFS and are calculated as a weighted average based on up to five jobs. It would be more desirable to use the after-tax wage rate, however due to data limitations, information on tax rates is unavailable. Further, since detailed income information for the relevant tax year is also unavailable the possibility of estimating appropriate tax rates is precluded.

Expenditures on child care are reported at the family level based on total expenditures for all children in the family during the reference week. The hourly cost of care faced by working mothers is calculated by dividing total expenditures over all children by the actual hours of work reported during the reference week. The CNCCS distinguishes child care costs related to working from the those costs incurred from studying, entertainment, or other activities. Indeed, this distinction is important since employment behaviour is the focus of this paper. Therefore, total child care expenditures include only those related to the mother working.

Demographic variables drawn from the CNCCS include the number and ages of the children in the family, the age and education level of the mother, the availability of alternative

[10]The CNCCS data were collected by Statistics Canada in partnership with Health and Welfare and the National Day Care Research Network. All computations on these microdata were prepared by the author and the responsibility for the use and interpretation of these data is entirely that of the author.

[11]The CNCCS only obtained income data based on the previous year (1987). Also, the income variables are defined as total income in categories for the mother and total income in categories for the spouse. Therefore, one is unable to distinguish earned and unearned income. Consequently, it is not possible to define "unearned family income" by the mother's unearned income plus her spouse's total income.

caregivers including the presence of another adult or an older child in the household and the flexibility of the husband's hours of work[12], the immigrant status of the mother, and the size of area (urban versus rural) and regional location of residence of the household.

The estimation sample of data used for this study contains observations for 1,314 married women with at least one child under the age of thirteen. Summary statistics for this sample are presented in Table 1 (where all averages and relative frequencies are weighted). Table 1 also reports the statistics conditional on the mother's labour force participation and the use of paid child care arrangements. Among these families, 686 had a mother who worked. Of the families with employed mothers, 290 paid for at least some child care arrangements, while 396 used solely unpaid care.

Mothers in the labour force worked an average of 32 hours per week. These women were on average older and had a higher level of education. Working mothers have relatively fewer children aged 0-2 and 3-5 and have relatively more children aged 10-12 than the women who did not work. Also there are relatively more women residing in Atlantic Canada, Quebec, and BC who are not working compared with the regional distribution of the whole sample.

Families who paid for care had mothers who worked longer hours, received higher wages, had higher levels of education, and were relatively younger. These families were also likely to have a substantially larger number of younger children and fewer older children. With respect to the mothers' immigrant status, a substantially higher proportion of immigrant mother's who paid for care were English/French speaking immigrants rather than non-English/French speaking immigrants, while a larger proportion of non-English/French speaking versus English/French speaking immigrants used unpaid care. In terms of the availability of alternative caregivers, families using paid care had fewer additional adults and teenagers in the home and a relatively higher proportion of husbands with inflexible hours of work compared to those families using unpaid care.

5 Empirical Results

5.1 Reduced Form Results and Supporting Equations

Results from the reduced form labour force participation (LFP) probit and the log wage equation are found in Table 2. The results of the reduced form probit equation indicate that the number of infants and pre-school aged children in the family have a significant negative effect on the probability of labour force participation where infants have a substantially

[12]Within the definition of non-flexible versus flexible hours of work, spouses who did not work during the reference week are included with those who are working and have flexible hours of work.

larger impact. The number of school aged children in the family has a negative but insignificant effect on labour force participation. Increases in education levels are associated with significant increases in the probability of participating in the labour market, while the age of the mother ceteris paribus has a negative although insignificant impact. Higher levels of unearned income have a negative impact on participation, however only the highest income category is significant. Living in Atlantic Canada, Quebec, or B.C. significantly lowers the probability of participating in the labour market compared to living in Ontario, and residing in a rural area has a positive but insignificant impact. Being an immigrant in Canada does not have a statistically significant effect on participation.

The results from the log wage equation (corresponding to equation (11) in section 3) are consistent with those usually found in the labour supply literature.[13] As expected, increases in the mother's level of education and her age have a significant positive effect on wages. Increases in the number of children in the household which is included as a proxy for labour market interruptions, have a highly significant negative effect on wages. Each additional child is estimated to reduce her wages by 7 percent. If the mother is a non-English/French speaking immigrant , it is estimated that she will receive 12 percent lower wages. Finally, living on the Prairies or in Atlantic Canada has a negative effect on wages relative to living in Ontario with the magnitude being worse in the East (25 percent less).

The results of the two-stage estimation procedure are shown in Tables 3 and 4. Focusing initially on the results from the bivariate probit, from Table 3 we see that having younger children significantly increases the likelihood of paying for care, while having school-aged children significantly reduces the probability of paying for care. In terms of the presence of alternative child care providers, having a teenager in the household has a significant negative effect on the probability of paying and the presence of another adult has a negative but insignificant impact. Having a spouse who does not have flexible hours of work significantly increases the probability of paying for care. Being a non-English/French speaking immigrant reduces the probability of paying for care which supports the hypothesis that these individuals are more likely to have access to a community support system. Living in a rural area significantly lowers the probability of paying for care.

Finally, the correlation coefficient between paying for care and participating in the labour market is -.40 and significant which implies that zero cost (monetary) child care is more likely to be available to those mothers participating in the market ceteris paribus. Connelly (1992) and Kimmel (1992) also report corresponding significant correlation coefficients for married

[13]The specification of the wage equation was limited to the extent that data for variables such as experience and industry/occupation are not available for the whole sample, but only for those people who held jobs.

women of -0.38 and -0.875, respectively.

The results from the OLS child care expenditure equation (corresponding to equation (12) in section 3) corrected for the selection bias are shown in Table 4. Accounting for the selection of who pays for care, all of the number of children variables up to the age of 10 have a significant positive impact on the cost of child care. As expected, the impact of having a child aged 0-2 is the largest since caring for infants is relatively more time intensive compared to providing care for older children. Increasing the number of 6-9 year olds has roughly half the impact as for children aged 3-5. These relative magnitudes are consistent with what we would expect since children aged 6-9 are in school part of the day. Once the mother is paying for care, the presence of other potential caregivers in the family and whether or not the family resides in a rural versus urban area do not significantly affect the cost of care.

While the correlation coefficient from the bivariate probit is negative and significant, the coefficient on the selection term in the child care expenditure equation is insignificant. This suggests that there exists selection between whether one participates in the market and whether one pays for care, however the "amount" one pays for child care among those who so pay is not significantly affected by selectivity into the set of child care payers.

5.2 Structural Labour Force Participation and Hours of Work Estimates

The results for the structural LFP probit and the labour supply hours equation (corresponding to equations (9) and (10) above) are found in Table 5. The predicted hourly wage and cost of care instruments computed from the estimated wage and child care expenditure equations have been substituted into the econometric specification. Wages are estimated to have a significant positive effect on both labour force participation and hours of work. The hourly cost of child care has a negative although insignificant impact on LFP and a significant negative effect on hours of work. These basic results are consistent with the implications of the underlying behavioural model.

Controlling for the cost of child care, the number of children aged 0-2 and 3-5 continue to have a significant negative impact on LFP. Each additional child aged 0-2 and 3-5 is estimated (by calculating the marginal effects in the LFP probit model) to reduce the probability of participating in the labour market by 14% and 6%, respectively. However, these variables do not have a significant impact in the labour supply hours equation. This would suggest that women with young children would no longer be expected to supply significantly less labour controlling for the cost of child care.

Only the highest category of unearned income has a negative impact on the mother's LFP

decision, while all increasing categories of unearned income impact negatively on hours of work, although insignificantly in both equations. Given the fact that one continuous measure of unearned income is unavailable and we are constrained to use a series of five dummy variables, the lack of significant results is perhaps not surprising based on the sample size.

Controlling for both wages and the cost of child care, the mother's immigrant status does not significantly impact her labour force participation decision. It does, however, have a significant positive impact on the amount of labour supplied – given the decision to work, immigrant mothers work substantially longer hours by about five hours per week. The magnitude is slightly higher for those immigrants who are non-English/French speaking. This result is consistent with recent evidence which shows that married immigrant women work longer hours and that the labour supply of married immigrant women is less elastic with respect to wages compared to that of married native-born Canadian women (Dhawan, 1994).

Further, controlling for the regional impact on wages and the cost of care, regional variation continues to impact on the LFP decision and the hours of work. These variables also affect the hours of work differently than they affect the probability of participating in the labour market. Residing in Atlantic Canada, Quebec, or BC significantly reduces the probability of labour force participation relative to living in Ontario by 12%, 15%, and 12%, respectively. However, given the decision to participate, hours of work are not significantly reduced in any of the specified regions. And, living in the Atlantic region has a strong significant positive impact on the hours of labour supplied by the mother. This suggests that those women living in areas where the unemployment rate is relatively high tend to work more hours given that they have been able to secure a job.

Finally, the selection term in the hours of work equation is significant which supports the hypothesis that there exists correlation between the decision to work and the number of hours worked.

Table 6 presents both participation and labour supply elasticities based on the estimation results in this paper. The wage elasticity for labour force participation evaluated at the sample means is 0.45. The child care price elasticity for LFP, however, evaluated at the sample means is only -0.06. This measure is lower than all of those reported by the American studies. While it is closest to that reported by Connelly (1992) of -0.20, it is substantially lower than the child care price elasticity measure of -0.74 obtained by Ribar (1992). Mid-range measures of -0.30 and -0.34 were reported by Kimmel (1992) and Blau and Robins (1988), respectively. Ribar notes that his relatively large elasticity measure may result from using child care expenditures per hour of care per child instead of expenditures per week or per hour of work.

Table 6: LFP and Labour Supply Elasticities

	LFP	Hours of Work
Wage	0.45	0.26
Price of Child Care	-0.06	-0.11

This paper also reports a child care price elasticity for hours of labour supply of -0.11. For comparative purposes, the empirical work in the U.S. has focussed mainly on the labour force participation decision of the mother. However, Michalopoulos, Robins, and Garfinkel (1992) do report an elasticity measure of hours of work with respect to child care subsidy rates to be 0.0018. Their results imply that subsidies have almost no effect on hours worked for those mothers already in the labour market. Quite different results are found by Averett, Peters, and Waldman (1992) who use their estimation results based on the effective wage (wage net of child care costs and the child care tax credit) to calculate an elasticity of labour supply with respect to the cost of formal child care of -.52.

This paper reports the uncompensated wage elasticity for labour supply to be 0.26. Hum and Simpson (1991) summarize the range of uncompensated wage elasticities for labour supply based on Canadian studies using cross-sectional microdata to be from -0.65 to 1.28 with a mean of 0.11.

To further assess the potential effects of particular child care policies which subsidize the cost of care, simulations on the probability of participation are performed at different levels of subsidization. The predicted probability of labour force participation across all women in the sample is 52.3%. This measure is very close to the actual participation rate in the sample which is 52.2%. If child care costs were subsidized 50%, the model predicts a LFP rate of 53.8%. If child care costs were fully subsidized (ie., universal zero-cost care) the model predicts that 55.3% of married women would participate. Connelly's (1992) model predicts that full subsidization would increase the participation rate from 58.8% to 68.8%. Blau and Robins (1988) found the participation rate to be much more sensitive and they predicted that if child care costs were zero 87% of married women would be employed. Kimmel (1992) predicted that for single mothers free child care would increase the probability of LFP from 57.6% to 80.6%.

Connelly (1992) points out that as more women enter the labour force the availability of informal care will decline. Calculating the probability of participation if all women had to pay for care highlights the impact of the current level of availability of no-cost child care. She predicted that only 46.6% of women would be participating in the labour market

if they all had to pay for child care. In this paper, substituting $E(P_c|P_c > 0)$ for $E(P_c)$, the model predicts that the participation rate will only fall to 51.6%. However, as more women enter the labour force, not only will the availability of zero-cost care be lower but also that of low-cost informal care. Therefore, if we are left at the margin with that segment of the population who do not have access to zero- or low-cost care, we can expect child care subsidies to have an even greater impact on labour force participation and/or the rate of increase in participation rates.

6 Conclusions and Future Research

This paper has presented the first Canadian estimates of the impact of child care costs on the labour force participation decision of married women and on the hours of work supplied by the mother. The estimates are based on a pooling of two microdata sets: the 1988 National Child Care Survey and the 1988 Monthly Labour Force Survey. The economic model drawn from Connelly (1992) predicts that increases in the wage rate and decreases in the cost of child care will increase the probability of labour force participation. The empirical results are consistent with the implications of the model – wages are estimated to have a significant positive effect on both the LFP decision and hours of work, and the hourly cost of child care has a negative although insignificant impact on the LFP decision and a significant negative effect on hours of work.

The child care price elasticity for participation of -.06 was found to be lower than all of those measures reported by previous American studies. This paper also reported a child care price elasticity for hours worked of -.11 which was slightly lower than the reported uncompensated wage elasticity for labour supply. These results suggest that child care costs have their effect primarily on hours worked rather than on labour force participation. Finally, it was noted that, if child care subsidies were directed at that segment of the population who do not have similar access to low-cost child care, such as single mothers, we can expect subsidies to have a greater impact on the labour supply of these women.

In order to address further policy issues within the child care debate such as the quality of care and the affordability of "licensed daycare", the research started in the paper will be extended to estimate a simultaneous model of labour supply and the demand for several different types of care (such as, centre, sitter, relative etc.). This will allow us to jointly determine the price sensitivity of different types of child care. Hence, if one form of care is considered more appropriate in terms of quality from a societal point of view, this analysis would shed light on the degree to which government subsidies would impact on both labour

supply decisions and the type of care used by mothers.

Finally, it should be noted that further future research is required to extend these static models to dynamic life-cycle models that incorporate longitudinal data. Indeed, public policy with respect to child care need not only affect whether or not a woman works at a point in time but can affect the whole life-cycle decision making process with respect to jobs and careers.

Table 1: Means of Demographic and Economic Variables

Variable	All Obs.	Nonworkers	Workers	Use Unpaid Care	Use Paid Care
Weekly hrs worked	-	-	32.44 (12.10)	30.61 (13.03)	34.73 (10.41)
Wage in $	-	-	11.82 (6.14)	11.13 (5.98)	12.68 (6.23)
Hourly cost of child care	-	-	0.92 (1.56)	-	2.07 (1.76)
No. of children aged 0-2	.41 (.59)	.53 (.63)	.31 (.53)	.14 (.43)	.51 (.57)
No. of children aged 3-5	.37 (.54)	.43 (.56)	.33 (.52)	.19 (.43)	.50 (.56)
No. of children aged 6-9	.53 (.66)	.51 (.65)	.54 (.66)	.52 (.66)	.56 (.66)
No. of children aged 10-12	.42 (.59)	.33 (.56)	.51 (.60)	.70 (.59)	.26 (.51)
No. of children under 17	2.01 (.86)	2.03 (.92)	2.00 (.80)	2.02 (.81)	1.97 (.78)
Unearned income:					
0-10,000	6%	6%	7%	7%	7%
10,001-20,000	16%	18%	15%	19%	10%
20,001-30,000	27%	26%	28%	27%	29%
30,001-40,000	29%	26%	32%	29%	36%
40,001-50,000	11%	13%	10%	10%	9%
50,001 +	10%	11%	9%	8%	10%
Education of mother:					
none or elementary	7%	10%	5%	8%	2%
high school	50%	55%	45%	48%	42%
some post sec.	10%	8%	11%	11%	11%
post sec. diploma	20%	16%	23%	23%	24%
university degree	13%	11%	15%	10%	22%
Age of mother:					
15-19 years	.2%	.1%	.3%	.4%	.2%
20-24 years	7%	10%	4%	3%	5%
25-34 years	49%	53%	46%	33%	61%
35-44 years	40%	31%	47%	59%	32%
45 years +	5%	6%	3%	5%	1%
Rural area	24%	25%	24%	28%	20%
Region:					
B.C	10%	11%	9%	10%	7%
Alberta	10%	10%	10%	12%	9%
Man/Sask	9%	9%	9%	11%	7%
Ontario	33%	27%	37%	34%	41%
Quebec	29%	31%	26%	26%	27%
Atlantic	10%	11%	8%	7%	9%
Imm., Eng./Fr. speaking	8%	6%	9%	9%	9%
Imm., non-Eng./Fr. speaking	8%	8%	9%	14%	2%
Other adult in household	12%	11%	13%	18%	7%
Teenager in household	23%	18%	26%	38 %	11%
Husband hours are not flexible	69%	66%	71%	68%	76%
Observations	1314	628	686	396	290

Note: Standard errors are found in the parentheses. Data are weighted using family weights.

Table 2: Reduced Form LFP Probit and Log Wage Coefficient Estimates

	LFP Probit Equation			Log-Wage Equation		
Variables	Coeff.	t-stat.	p-value	Coeff.	t-stat.	p-value
Intercept	0.5696	(0.704)	(0.481)	1.6865	(14.340)	(0.000)
Age of mother 20-24	-0.8987	(-1.151)	(0.250)	0.3164	(2.559)	(0.011)
Age of mother 25-34	-0.5102	(-0.661)	(0.508)	0.4876	(6.938)	(0.000)
Age of mother 35-44	-0.5398	(-0.697)	(0.486)	0.5623	(7.621)	(0.000)
Age of mother 45+	-1.1035	(-1.399)	(0.161)	0.6754	(6.383)	(0.000)
Mother completed high school	0.4143	(2.755)	(0.006)	0.1414	(1.934)	(0.053)
Mother has some post sec. ed.	0.8383	(4.532)	(0.000)	0.3224	(3.721)	(0.000)
Mother has post sec. diploma	0.8964	(5.351)	(0.000)	0.4581	(5.646)	(0.000)
Mother has university degree	1.0357	(5.584)	(0.000)	0.6730	(7.333)	(0.000)
No. of children under 17	0.0681	(0.474)	(0.635)	-0.0722	(-3.291)	(0.001)
Immigrant, Eng./Fr. speaking	-0.0941	(-0.570)	(0.568)	0.0192	(0.225)	(0.822)
Immigrant, non-Eng./Fr. speaking	-0.0503	(-0.275)	(0.784)	-0.1178	(-1.342)	(0.179)
Rural area	0.1182	(1.423)	(0.155)	0.0288	(0.778)	(0.436)
B.C.	-0.3048	(-2.039)	(0.041)	0.0194	(0.296)	(0.767)
Alberta	-0.0813	(-0.601)	(0.548)	-0.0727	(-1.258)	(0.208)
Manitoba/Saskatchewan	-0.0895	(-0.703)	(0.482)	-0.1570	(-2.877)	(0.004)
Quebec	-0.3197	(-2.476)	(0.013)	0.0077	(0.122)	(0.903)
Atlantic	-0.4358	(-3.588)	(0.000)	-0.2458	(-4.333)	(0.000)
No. of children aged 0-2	-0.6191	(-3.722)	(0.000)			
No. of children aged 3-5	-0.3519	(-2.183)	(0.029)			
No. of children aged 6-9	-0.2530	(-1.620)	(0.105)			
No. of children aged 10-12	-0.0435	(-0.267)	(0.790)			
Unearned income 10,001-20,000	0.0407	(0.268)	(0.789)			
Unearned income 20,001-30,000	0.0783	(0.533)	(0.594)			
Unearned income 30,001-40,000	-0.0657	(-0.431)	(0.666)			
Unearned income 40,001-50,000	-0.1188	(-0.678)	(0.498)			
Unearned income 50,000+	-0.4358	(-2.275)	(0.023)			
Husband's hours not flexible	0.1658	(2.057)	(0.040)			
Presence of teenager	-0.1081	(-0.517)	(0.605)			
Presence of other adult	-0.0334	(-0.264)	(0.791)			
Lambda				-0.0256	(-0.281)	(0.7791)
$\bar{R}^2$				0.2411		
Log-Likelihood	-819.3858					
Number of Observations	1314			686		

Table 3: Bivariate Probit Coefficient Estimates

	LFP Probit			Pay for Care Probit		
Variables	Coeff.	t-stat.	p-val.	Coeff.	t-stat.	p-val.
Intercept	0.4863	(0.562)	(0.574)	0.2213	(1.034)	(0.301)
No. of children aged 0-2	-0.5931	(-3.521)	(0.000)	0.4417	(4.069)	(0.000)
No. of children aged 3-5	-0.3330	(-2.034)	(0.042)	0.3886	(3.635)	(0.000)
No. of children aged 6-9	-0.2243	(-1.421)	(0.155)	-0.1066	(-1.055)	(0.292)
No. of children aged 10-12	-0.0142	(-0.086)	(0.932)	-0.6230	(-5.192)	(0.000)
Husband's hours not flexible	0.1634	(2.027)	(0.043)	0.3355	(2.690)	(0.007)
Presence of teenager	-0.0736	(-0.343)	(0.732)	-0.7279	(-4.741)	(0.000)
Presence of other adult	-0.0299	(-0.241)	(0.809)	-0.2891	(-1.492)	(0.136)
Immigrant, Eng./Fr. speaking	-0.0894	(-0.552)	(0.581)	-0.2091	(-0.743)	(0.457)
Immigrant, non-Eng./Fr. speaking	-0.0484	(-0.258)	(0.796)	-0.4667	(-1.459)	(0.144)
Rural area	0.1259	(1.491)	(0.136)	-0.2531	(-2.220)	(0.026)
B.C.	-0.2890	(-1.977)	(0.048)			
Alberta	-0.1066	(-0.768)	(0.443)			
Manitoba/Saskatchewan	-0.1319	(-1.010)	(0.312)			
Quebec	-0.2925	(-2.294)	(0.022)			
Atlantic	-0.4233	(-3.464)	(0.001)			
Age of mother 20-24	-0.8412	(-1.005)	(0.315)			
Age of mother 25-34	-0.4137	(-0.499)	(0.618)			
Age of mother 35-44	-0.4538	(-0.545)	(0.585)			
Age of mother 45+	-1.0312	(-1.221)	(0.222)			
Mother completed high school	0.4123	(2.863)	(0.004)			
Mother has some post sec. ed.	0.8178	(4.552)	(0.000)			
Mother has post sec. diploma	0.8984	(5.572)	(0.000)			
Mother has university degree	1.0552	(5.813)	(0.000)			
No. of children under 17	0.0386	(0.267)	(0.789)			
Unearned income 10,001-20,000	0.0164	(0.105)	(0.916)			
Unearned income 20,001-30,000	0.8600	(0.563)	(0.573)			
Unearned income 30,001-40,000	-0.0478	(-0.302)	(0.763)			
Unearned income 40,001-50,000	-0.1069	(-0.594)	(0.552)			
Unearned income 50,000+	-0.4358	(-2.275)	(0.023)			
rho	-0.3964	(-2.004)	(0.045)			
Log-Likelihood	-1168.310					
Number of Observations	1314					

Table 4: Child Care Expenditure Equation

	Cost of Child Care		
Variables	Coeff.	t-stat.	p-val.
Intercept	0.3966	(1.345)	(0.179)
No. of children aged 0-2	1.1766	(4.824)	(0.000)
No. of children aged 3-5	0.6428	(3.553)	(0.000)
No. of children aged 6-9	0.4356	(2.827)	(0.005)
No. of children aged 10-12	-0.1836	(-1.277)	(0.202)
Husband's hours not flexible	0.4113	(2.693)	(0.007)
Presence of teenager	-0.1587	(-0.816)	(0.415)
Presence of other adult	-0.0816	(-0.235)	(0.814)
Immigrant, Eng./Fr. speaking	1.5637	(1.417)	(0.157)
Immigrant, non-Eng./Fr. speaking	-0.0824	(-0.203)	(0.839)
Rural area	-0.1005	(-0.431)	(0.666)
Lambda	-0.0261	(-0.623)	(0.533)
$\bar{R}^2$	0.1777		
Number of Observations	290		

Table 5: Structural Labour Force Participation Probit and Labour Supply Equation

	LFP Probit			Hours of Work		
Variables	Coeff.	t-stat.	p-value	Coeff.	t-stat.	p-value
Intercept	-0.1784	(-0.743)	(0.457)	23.793	(4.725)	(0.000)
Predicted Wage	0.0616	(3.881)	(0.000)	0.8430	(2.842)	(0.004)
Predicted Cost of Child Care	-0.0531	(-0.592)	(0.553)	-2.4385	(-2.071)	(0.038)
No. of children aged 0-2	-0.3549	(-3.011)	(0.003)	-0.3978	(-0.218)	(0.928)
No. of children aged 3-5	-0.1508	(-1.685)	(0.092)	0.8784	(0.733)	(0.464)
Unearned income 10,001-20,000	0.1144	(0.780)	(0.435)	-1.1126	(-0.518)	(0.604)
Unearned income 20,001-30,000	0.2119	(1.501)	(0.133)	-1.9604	(-0.953)	(0.340)
Unearned income 30,001-40,000	0.0922	(0.635)	(0.525)	-0.9417	(-0.453)	(0.650)
Unearned income 40,001-50,000	0.0458	(0.271)	(0.768)	-0.9629	(-0.406)	(0.684)
Unearned income 50,000+	-0.2422	(-1.300)	(0.193)	-2.4974	(-0.821)	(0.412)
Immigrant, Eng/Fr. speaking	-0.0065	(-0.031)	(0.975)	4.7921	(1.722)	(0.085)
Immigrant, non-Eng./Fr. speaking	-0.0738	(-0.411)	(0.681)	5.4016	(2.628)	(0.009)
B.C.	-0.3111	(-2.099)	(0.036)	-3.1180	(-1.506)	(0.132)
Alberta	-0.0091	(-0.068)	(0.946)	-0.9270	(-0.549)	(0.583)
Manitoba/Saskatchewan	0.0315	(0.249)	(0.803)	-1.7954	(-1.100)	(0.271)
Quebec	-0.3694	(-2.922)	(0.003)	-2.6484	(-1.579)	(0.114)
Atlantic	-0.2984	(-2.454)	(0.014)	2.6833	(1.824)	(0.068)
Lambda				6.2655	(1.754)	(0.079)
Log-Likelihood	-857.8901					
$\bar{R}^2$				0.0333		
Number of Observations	1314			686		

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