THE SURVEY OF INCOME AND PROGRAM PARTICIPATION

The Effect of Child Care Costs on Married Women's Labor Force Participation

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The Effect of Child Care Costs on Married Women's Labor Force Participation

The increase in women's labor force participation after World War II is a well known and well researched phenomenon. Much less well understood, however, is the central role that child care plays in that increase in the participation. The surge in women's labor force participation in the 1980s has been driven mainly by the rapid increase in the labor force participation of women with young children. In March 1985, half of all married women (with husband present) with a child less than two were in the labor force. Five years earlier, in 1980, the figure was 39%, while in 1970, the figure was 24%.[1] As very few of these women care for their child while at work, most rely on an alternative caregiver.[2] In some cases that caregiver is the husband or other family members, but the vast majority of women who participate in the formal labor market use a caregiver outside the immediate family. This alternative caregiver and the market for extra-family child care that brings parents and caregivers together, thus provides the mechanism for most women with young children to participate in the labor market.

As entering the labor market is strongly linked with participating in the child care market, we expect women's decisions on participation in the labor market to depend in part on the cost of child care. In this paper we explicitly consider the role child care costs play in the decision of women with young children to participate in the labor market. In the past, most studies of women's labor force participation have included a variable or set of variables which indicates the presence of young children in the household. Whether because of child care costs that would be incurred if

the woman participated in the labor market, or because of the woman's increased productivity of being home with her children, the presence of young children is always expected to increase the reservation wage, lowering the probability of participation. This approach can be thought of as a reduced form, while ours is an attempt to estimate the structural relationship of child care costs to the decision to participate.

Knowledge of this structural relationship will add to our understanding of women's decision making and to the previous findings on the significance of the presence of young children on labor market participation. The structural analysis allows us to separate the effect of children on women's labor force participation which comes from increased costs of child care from other aspects of home production associated with young children. This is an important distinction to make when considering the factors affecting early decision making on marriage, fertility, human capital investment and labor force attachment of young women and for assessing public policy options available for affecting change in these areas. For example, our analysis indicates that the lower labor market participation rate of mothers with preschoolers is entirely a function of higher child care costs while mothers of infants (less than 3) continue to have lower participation rates controlling for the cost of child care. Thus, a policy which lowers child care costs for young children is expected to increase the participation rate of mothers whose youngest child is a preschooler, more than those with infants.

In Section II we offer a theoretical model of labor force participation that explicitly considers the needs of children to be cared for and the cost of non-maternal care. This theoretical model provides a basis for an

empirical specification of the participation decision which explicitly includes the cost of the child care paid by the family which is presented in in Section III. Section IV discusses the estimation of child care costs necessary for the model. Section V contains the estimates of the labor force participation equation and Section VI concludes the paper.

Section II: The Theoretical Model

The decision of a mother with young children to participate in the formal labor market is modelled as the outcome of maximizing her utility over goods, X and leisure, ℓ, $U = U(X,\ell)$, subject to a production function for X, a money budget constraint and two time constraints.[3] As in Gronau (1977), we assume that the composite good X can be purchased in the market or produced at home. Since we are concerned with modelling child care, we simplify home production by letting child quality, Q, be the only good which is potentially produced at home. X_m is all other market purchased goods, such that, $X = X_m + Q$.

The production of child quality, Q depends on the amount of time the mother spends with her children, t_Q, the amount of time children spend in extra-family child care, t_{cc}, and the quality of that care, q.[4]

$$Q = Q(t_Q, t_{cc}q; N,A) \tag{1}$$

$$\frac{\partial Q}{\partial t_Q} = Q_1 > 0 \quad \frac{\partial Q}{\partial t_{cc}q} = Q_2 > 0 \quad Q_{11} < 0 \quad Q_{22} < 0$$

Note, the production function is conditioned on N, the number of children in the family and A, the age structure of the children both of which are taken as exogenous.

We impose three additional constraints on the maximization process: a

budget constraint, a mother's time constraint and a child's time constraint, (2)(3)(4) respectively.

$$t_m W + V = X_m + P_{cc} t_{cc} \tag{2}$$

$$t_m + t_Q + \ell = 1 \tag{3}$$

$$t_Q + t_{cc} = 1 \tag{4}$$

where

t_m is time in market work

W is the market wage

V is nonlabor income including husband's earnings

P_{cc} is the family expenditure on child care which is a function of q, N, and A

t_{cc} is time the children spent in child care

The first order condition for this maximization problem is

$$\frac{U_\ell}{U_X} = W = Q_1 - (Q_2 q^* - P^*_{cc}) \tag{5}$$

where P^*_{cc} is the price of child care at the optimally chosen level of q, q^*. Thus, for women engaged in all three uses of their time, the marginal rate of substitution between goods and leisure will just equal the wage which will equal the net benefit of an hour of parental child care. The net benefit of parental child care time is a function of P^*_{cc} which depends on the quality of extra-family child care chosen. The model predicts that parents will choose q until the marginal benefit of an increase in q is just equal to the marginal cost of that same increase in $q, Q_2 = \frac{\partial \bar{p}}{\partial q}$.

Women for whom $W < Q_1 - (Q_2 q^* - P^*_{cc})$ do not participate in the labor market. An exogenous decrease in the entire price schedule for child care will change the net benefit of an hour of parental child care, shifting the

net benefit curve to the right and making it more likely that the woman works in the labor market. An increase in the number of children in the family has a direct effect on the production function and an indirect effect by increasing the total cost of child care. If there are economies of scale in home produced child quality, then an increase in N will lower the probability of participating in the market. For those who continue to participate in the labor market, potential money income has declined and part of that decline may result in decrease in the quality of extra-family child care used.

Likewise an increase in the age of one's children directly affects the net benefit of time at home through the production function of Q and indirectly affects it through a decrease in the cost of child care. The cost of child care is lower for older children since public school can be thought of as approximately six hours of free child care per day. As we noted above, lowering the cost of child care shifts the net benefit curve to the right and increases the probability that one will work. The direct effect on the production function of aging children should further shift the net benefit curve to the right increasing the probability of employment. One of the advantages of the structural model which we estimate below is that we can separate the effect of changes in the cost of child care due to the age of the child from other changes in the production function for child quality.

A peculiarity of the market for extra-family child care is that all families do not face the same prices in the market. Heckman (1974) and Blau and Robins (1988) have each emphasized the potential some families have for lower cost (at least in monetary terms) informal care, most often provided

by a relative.[5] Like anything else that lowers the costs of child care, the availability of lower cost child care should increase the probability of labor force participation.

In sum, our model predicts that for those women who are participating in the market, the market wage is expected to equal the shadow value of their time, as in Heckman (1974). However, in our model, a woman adjusts her t_m and t_Q until the wage is equal to the net benefit of parental time in child care. We expect that increasing the number of children or having younger children will increase the cost of child care to the family, and thus lower the probability of employment of the caregiving parent. The presence of other potential caretakers in the household, such as older siblings or other adults, may lower the amount parents pay for child care, increasing the probability of employment. Lastly, a government policy which results in lowering the cost to families of child care should also increase the prcbability of working. In the remaining sections of the paper we attempt to test these hypotheses by developing an estimation procedure that explicitly includes the cost of child care to all potential users of child care.

Section III: Deriving The Estimation Equation -- The Structural Probit

One of the outcomes of the model of labor market decision making offered above is that we expect that the wage in the market will equal the shadow value of one's time which will equal the net benefit of mothers' time with children. Let W be the natural log of the market wage, S be the shadow value of time and Γ be the net benefit of t_Q. Let S be a linear function of

the independent variables

$$S = \gamma_0 + \gamma_1 \ell + \gamma' G + \epsilon_1 \tag{6}$$

where G is the vector of variables which affects the marginal rate of substitution between goods and leisure. We also assume that Γ is a linear function of the chosen price of child care and, D, a vector of variables which affect the production function of child quality.

$$\Gamma = \alpha_0 + \alpha_1 t_Q + \alpha_2 P_{cc} + \alpha' D + \epsilon_2 \tag{7}$$

Assuming that t_m and t_Q adjust so that $W = S = \Gamma$, we can set $\Gamma = W$ and solve (7) for t_Q. Then substituting into (6) using the identity $\ell \equiv 1 - t_m - t_Q$ we get

$$t_m = \left[\frac{\alpha_0}{\alpha_1} - \frac{\gamma_0+\gamma_1}{\gamma_1}\right] - \left[\frac{1}{\gamma_1} + \frac{1}{\alpha_1}\right] W + \frac{\left[\alpha_2 P_{cc} + \alpha' D\right]}{\alpha_1} + \frac{\gamma'}{\gamma_1} G + \left[\frac{\epsilon_2}{\alpha_1} + \frac{\epsilon_1}{\gamma_1}\right] \tag{8}$$

Rewriting (8) in terms of a new set of parameters δ_i, a woman is expected to work in the market if

$$\delta_0 + \delta_1 W + \delta_2 P_{cc} + \delta'(D+G) > \eta_1 \quad \text{where } \eta_1 = \frac{\epsilon_2}{\alpha_1} - \frac{\epsilon_1}{\gamma_1} \tag{9}$$

Assuming that ϵ_1 and ϵ_2 are distributed normally, we can estimate the parameters of (9) using a probit model. With most data available we are prevented from estimating (9) directly as we lack information on wages and expenditure on child care for those women not currently participating in the labor market. Instead we could estimate a reduced form probit:

$$I^* = Z\theta + u_1 \qquad (10)$$

$$I = 1 \quad \text{iff} \quad I^* > 0 \qquad u_1 \sim N(0,\sigma_1^2)$$

$$I = 0 \quad \text{iff} \quad I^* \leq 0$$

where I is the dummy variable indicating participation in the labor market, I^* is the latent continuous variable measuring propensity to participate and Z is the vector of all determinants of participation including those that enter indirectly through the wage or the price of child care.

The problem with estimating the reduced form is that it will not allow us to identify the direct effect of child care costs on participation. Instead, we must directly address the problem of incomplete wage and cost of child care data by estimating the wage and cost of child care for all women using information from those women who are currently in the labor force. Both the wage equation and the child care expenditure equation must be corrected for sample selection bias. While the estimation of the wage equation has become standard and we do not deviate from this standard,[6] ours is the first study to estimate the expenditure on child care.[7] The estimation procedure used corrects both for the censored sample and for the large proportion of working mothers with no expenditure on child care.

Section IV: Estimating the expenditure on child care per hour worked

The measure of child care costs relevant to the labor supply decision of the mother is the total expenditure on child care per hour the mother works. We can think of this as the average hourly cost of child care.[8] We expect the average hourly expenditure on child care to vary per family

depending on the number of children in the family, and by the ages of the children. We also expect that the potential wage of the mother and the other income of the family will affect expenditures on child care. The lower the potential wage of the mother, the lower the expenditure on child care would have to be to allow for the equality of net benefit of time in t_Q to the market wage required for labor force participation. Higher income should lead to a higher level of child care quality chosen, leading to an increase in expenditure per hour. Lastly, we expect that those families with other potential caregivers present such as teenage children or other adults in the family will pay less on average than other families. Child care prices may also differ by location in the U.S. so we control for residence in an SMSA and in the South. Literature on black/white differences in extended families led us to include a control for race.

If we assume that these variables are linearly related to average child care expenditures we have:

$$P^*_{cc} = X\beta + u_2 \qquad (11)$$

where P^*_{cc} is the optimal expenditure on child care derived from the utility maximization model presented above, X is a vector of household characteristics and u_2 is a randomly distributed error term which we assume to be distributed $N(0, \sigma^2_2)$.

Two econometric issues prevent us from simply estimating (11) using OLS. The first is that we observe family expenditure on child care only when the mother is currently participating in the workforce. The second is that nearly two-thirds of those participating in the market are not paying anything for child care. The tobit specification was derived to deal with

this problem of zeros in consumer durable expenditures studies. However, to deal with both the selection problem and the nonlinearity caused by the large number of zeros at the same time, we need to estimate a tobit corrected for the selection of those participating in the labor market. We observe a positive price for child care only if $Z\theta > u_1$ and $X\beta > u_2$. Thus, we can rewrite (11) as:

$$P^*_{cc} = X\beta + E(u_2 | Z\theta > u_1,\ X\beta > u_2) + v_2 \qquad (12)$$

The second term (12) is the mean of a truncated bivariate normal distribution and is equal to:[9]

$$E[u_2 | X\beta > u_2 \text{ and } Z\theta > u_1] = \sigma_2\lambda$$

where

$$\lambda = \left[\phi\left(\frac{X\beta}{\sigma_2}\right)\Phi\left(\frac{\left(\frac{Z\theta}{\sigma_1}\right) - \rho\left(\frac{X\beta}{\sigma_2}\right)}{(1-\rho^2)^{\frac{1}{2}}}\right) + \rho\phi\left(\frac{Z\theta}{\sigma_1}\right)\Phi\left(\frac{\left(\frac{X\beta}{\sigma_2}\right) - \rho\left(\frac{Z\theta}{\sigma_1}\right)}{(1-\rho^2)^{\frac{1}{2}}}\right)\right] \cdot F(X\beta, Z\theta, \rho)^{-1} \qquad (13)$$

$F(X\beta,\ Z\theta,\ \rho) = \text{Prob}(X\beta > u_2,\ Z\theta > u_1)$

$\phi(\cdot)$ is a univariate probability density function
$\Phi(\cdot)$ is a univariate cumulative density function

$$\rho = \frac{\sigma_{12}}{\sigma_1\sigma_2}$$

We now estimate (12) using a two stage procedure similar to that suggested by Heckman (1976) for simple tobits. A bivariate probit is estimated for the decision participate/not participate, and pay/not pay for child care taking into account the selectivity of observing paying status only if one is participating. From this estimation we obtain consistent estimates of the parameter vectors β/σ_2 and θ/σ_1 and of ρ. Using these estimates we get estimates of λ of (13). In the second stage, we estimate (12) using OLS

including $\hat{\lambda}$ as a regressor. In this stage we include only those participants in the labor market for whom $P^{*}_{cc} > 0$.

The advantage of the proposed two stage procedure over a maximum likelihood estimate of the tobit equation is that it allows the coefficients that determine whether someone pays for child care to differ from the parameters that determine the amount paid for child care by those who are paying. Mroz (1987) shows the superiority of two stage "generalized tobit" specifications in estimating married women's labor supply. Here the case for separate parameters is even stronger, since we expect certain variables to primarily determine whether a family pays for child care while other variables determine how much a paying family pays. For example, we expect that the family compositions variables determine whether someone pays. Once a family decides not to make use of a potential caregiver, the presence of that potential caregiver should not determine how much the family pays. On the other hand, we expect nonlabor income and the predicted wage of the mother to have a greater impact on the amount paid once a family chooses to pay than on the choice of whether to pay at all for child care.

The data used to estimate child care costs as well as labor force participation equation comes from the 1984 Panel of the Survey of Income and Education (SIPP). All married women, 21 to 55 years of age with children under 13, who were present in the sample from the third to the fifth wave were selected.[10] Excluding those missing information on key variables, we obtain a sample of 2781 women. Table 1 presents the mean characteristics of these women.

In order to estimate the cost of child care for all families, we calculate the average child care cost per hour worked for working mothers.

In the fifth wave of questionnaires, which was administered between January and April of 1985, working parents were asked their total weekly expenditure on child care during the previous month for all children in the family. We calculate average child care cost per hour worked by dividing total weekly expenditures on child care by hours usually worked by the mother.

Independent variables included in our estimation of child care costs are the number of children in four age categories, mother's predicted wage, family income (excluding the earnings of the mother), locational and demographic control variables and a set of family composition variables. The family composition variables are a set of dummies which indicate the presence of teenagers, adult women beside the mother, adult men beside the husband and whether any of the adults in the family other than the mother are unemployed. These family composition variables are used to indicate the presence of alternative potential caregivers in the home.[11]

In the first stage of our estimation procedure we estimate a bivariate probit for paying/not paying and working/not working. Since the child care expenditure question refers to a typical week in the last month of the four month wave, we define "working" as working during the last week of the period. Wages for women who were working were calculated for the job or jobs in which the woman was currently employed as of the last day of the fifth wave. Hourly wages were derived from earnings from the job over the four month period of wave five divided by the total number of hours worked at the job in the period.[12]

Most of the variables used for estimating the probability of labor force participation are standard in the labor supply literature: education, work experience, number of children in various age categories, other family

income, race, and location variables. The work experience variable was calculated from the retrospective work history questions asked in wave three and then updated across waves four and five. Other family income is defined as all income from the primary family for the four month period of wave 5 excluding the labor earnings of the mother.

The results of two stage estimation are shown in Table 2. Column 1 presents the bivariate probit estimates for the determinants of pay/not pay. Column 2 shows the estimates of β from the OLS estimation for those mothers currently paying for child care. Focussing initially on Column 1 we see that mothers with more younger children are more likely to pay for care while those with more older children are less likely to pay for care. Nonlabor income significantly affects the probability of purchasing care but the predicted wage of the mother does not. All the family composition variables with the exception of other females present are negative and significant indicating that the presence of other potential caregivers lowers the probability of paying for care. Lastly, the correlation coefficient between paying for care and participating in the labor market is -.40. This confirms our expectation that those mothers participating in the market are more likely to have no (money) cost child care available to them.

Column 2 shows the effect of the independent variables on the amount paid for care, correcting for the selection of who pays for care and who participates in the labor market. As expected, the independent variables affect the price paid quite differently than they affect the probability of paying anything. Once we correct for the selection of who pays, now all of the number of children variables are positive, although only increasing the number of 6-9 years olds significantly affect the average cost per hours of

child care. As we predicted, there is a large change in the family composition variables from the column 1 to column 2. In column 2 the family composition variables are all insignificant. Once a mother is paying for care, the presence of other potential caregivers in the family does not affect the cost of the care. Also, as we predicted, the mother's wage has a significant positive effect on the amount paid. The coefficient on the mother's predicted wage is large compared with the other variables but it is still a very small number. When evaluated at the mean value of predicted wages for all mothers in our sample, it implies that a dollar increase in wages leads to a 7 cent increase in child care costs per hour. This small effect of wages on price paid for child care is in keeping with other studies on child care expenditure which show little variation in child care expenditures across income groups (Hofferth (1988), Waite, Leibowitz and Witsberger (1987)).

The coefficient on the selection term is insignificant. When taken with the significant negative correlation coefficient from the bivariate probit it indicates that the selection is between whether one participates and whether one pays for child care at all. Given that one will pay, those not participating in the market have an error structure similar to those currently participating.

Having corrected for the sample selection and the nonlinearity caused by the large number of zeros, we now use this final set of coefficients (Column 2, Table 2) to calculate the expected average cost of child care per hour for each woman. As we are interested in the cost of child care a woman faces when considering whether to work in the formal labor market, we want to estimate $E[P_{cc}|I = 1]$. This expected price is equal to the

probability of paying if one participates times the amount one would pay. Formally,

$$E[P_{cc_i}|I_i = 1] = Pr(P_{cc_i} > 0|I_i = 1) \cdot E[P_{cc_i}|X_iB > u_{2i} \text{ and } Z_i\theta > u_{1i} + Pr(P_{cc_i} = 0|I_i = 1)E[P_{cc_i}|P_{cc_i} = 0] \quad (14)$$

$$= \frac{F_i(X_i\hat{\beta}, Z_i\hat{\theta}, \hat{\rho})}{\Phi(Z_i\hat{\theta})} \cdot (\hat{\beta}'X_i + \hat{\sigma}_2\hat{\lambda}_i) + \frac{(1 - F_i)}{\Phi(Z_i\hat{\theta})} \cdot 0$$

$$= \frac{F_i(X_i\hat{\beta}, Z_i\hat{\theta}, \hat{\rho})}{\Phi(Z_i\hat{\theta})} \cdot (\hat{\beta}'X_i + \hat{\sigma}_2\hat{\lambda}_i)$$

This expected cost of child care is calculated for each woman in our sample and is used in estimating the structural probit. In Section V we present the results of the structural probit estimation.

Section V: Estimating the Effect of Child Care Costs on Married Women's Labor Force Participation

Having estimated the average expenditure on child care and wages for all women, we now estimate (9) substituting (14) for Pcc and E[W] for W. The results of the estimation are presented in Table 3. Column 1 differs from column 2 in the exclusion of education from affecting the value of home time. Column 3 reports the reduced form coefficients for comparison. The reduced form coefficients can be thought of as the net effect of the various personal and family characteristics on the labor force participation.[13]

Comparing columns 1 and 2, including education in the structural equation does not change the signs or the significance of the variables but

does increase the magnitude of the wage coefficient. The significant negative sign on education is in keeping with other studies of women's labor force participation and suggests that holding the wage constant, education also increases the value of one's time at home either in leisure or in the production of child quality. The net impact of education is positive as shown in column 3.

Focussing on the results in column 2, we see that the predicted cost of child care has a negative impact on the probability of participation, as our model predicted. Controlling for the effect on the cost of child care, an increase in the number of infants still lowers the probability of participating, however an increase in the number of preschoolers actually increases the probability of participating. Thus, the net negative impact of preschoolers shown in the reduced form equation is the result of the higher child care costs faced by women with preschoolers. Women with preschoolers could be expected to participate in the labor markets at rates equal to women with older children were it not for the cost of child care.

Nonlabor income continues to have a negative impact on participation, controlling for the cost of child care. The predicted wage of the mother has a large positive impact on participation. Controlling for the wage, living in an SMSA has a negative impact on participation while living in the South has a positive impact. However, wages are significantly higher in an SMSA. Column 3 shows that the net effect of living in an SMSA is no different from living outside an SMSA.

The results in Table 3 show that the labor force participation rate of married women is sensitive to the average cost of child care. One measure of how sensitive participation is to the cost of child care is the

average cost of child care which is -.14, when evaluated at the mean values of probability and child care cost. Another way to measure sensitivity is to examine how the probability of participation changes when the cost of child care changes. At the current mean level of child care costs the probability of participation for the average woman is .77.[14] If average child care costs were zero for the mean women, the predicted probability of participation is .84. This number is quite large but is very similar to the finding of Blau and Robins that the predicted probability of participation is .87 when weekly child care costs were zero.[15]

A third measure of sensitivity is derived by comparing the mean of the probabilities, $E[\Phi_i(\cdot)]$, from our sample. The mean of the probabilities from our sample using coefficient estimates of column 2 Table 3 is .5704. This is quite close to the actual proportion working in our sample of .5725. If there were universal no cost child care available, the model predicts that 59.5% of women would work. This approach shows a labor force fairly insensitive to the cost of child care in the current range.

We can also calculate the mean probability if all women had to pay for child care. Assigning $E[P_{cc_i} | P_{cc_i} > 0]$ as the $E[P_{cc_i} | I_i = 1]$ for each women we find that only 54.4% of women would be employed. This shows the impact of the no cost child care currently being used by working mothers. As more women enter the labor market, the opportunities for informal child care will decline. The much higher cost of paid care will have the effect of slowing down the rate of increase in women's labor force participation, everything else held constant.

Section VI: Summary

This paper has examined the effect of child care costs on the probability that married women with children will participate in the labor market. The utility maximizing framework predicts that child care cost will affect the participation decision through its effect on the net benefit of parental time in child care. Estimates of a structural probit model provide evidence to support this prediction.

Since our focus is on the labor supply decision of the mother, the relevant cost of child care is the total cost of child care for all children in the family per hour worked by the mother. We use information on family composition and on the family's weekly expenditure on child care for mothers who work to predict average child care costs for each mother in our sample. As such, this is the first study of child care costs to have actual data on child care expenditure combined with a micro level prediction procedure. The prediction process is complicated by the large number of people with zero expenditures and censored data. To deal with both problems we use a generalized tobit specification corrected for selection. The advantage of the procedure is that it separates the decision of whether to pay for care from the amount paid. The results confirm our expectations that certain variables affect the decision to pay while others affect the amount paid.

As more women enter the labor market, the opportunities for informal child care decline. As the availability of no cost care is shown to be positively correlated with participation this will have the effect of slowing down the rate of increase in women's labor force participation. On the other hand, if legislation is enacted to lower the cost of child care to some families, our results indicate that we should expect a positive impact

on participation rates especially for those women with preschoolers. In fact the lower rate of labor force participation among mothers of preschoolers was shown to be entirely the result of the higher child care cost faced by these women.

Table I

Sample Means for Married Women 21-55

with at Least One Child

Less Than 13

	All	Working Mothers	Working Women Paying For Child Care	Non Working Mothers
Education (yrs)	12.9	13.1	13.5	12.6
Work Experience (yrs)	9.2	11.0	10.81	7.0
Non Labor Income*	26,900	25,056	24,804	29,274
Number of Children				
Aged: 0-2	.39	.30	.49	.50
3-5	.43	.39	.60	.48
6-9	.54	.53	.43	.54
10-12	.37	.42	.16	.31
% with Children 13-18	25.4	28.6	9.4	21.2
% with Other Female in the Family	5.9	6.4	3.7	5.3
% with Other Male in the Family**	4.7	4.8	1.6	4.4
% with Unemployed Male in the Family***	6.0	5.6	2.3	6.7
% with Unemployed Other Female in the Family	2.8	2.8	1.2	2.6
% live in SMSA	66.5	66.0	67.0	67.3
% Non White	10.6	12.5	13.9	8.1
% Live in South	17.1	18.0	18.3	16.0
N	2781	1565	567	1216

* Total family income minus labor earnings of the women (4 month sum x 3)
** Excluding husbands since all are married with spouse present
*** Including husbands if unemployed

Source: 1984 Panel SIPP wave 5, Jan - April 1985

Table 2
Coefficient Estimates from the Two Stage
Generalized Tobit with Selection

	1 Bivariate Probit β/σ_2	2 2nd Stage OLS β
Constant	-.4033 (.5823)	.9433 (1.1959)
Number of Children		
Aged: 0-2	.4349* (.0826)	.0441 (.4355)
3-5	.4670* (.0647)	.0465 (.4301)
6-9	-.2294* (.0640)	.5943* (.2399)
10-12	-.5805* (.0852)	.7564 (.6239)
Nonlabor Income	.1735* (.0998)	.0049 (.2331)
Predicted wage	.1675 (.3077)	.4413* (.2472)
Presence of: Children 13-18	-.6721* (.1009)	.9375 (.7231)
Other adult female	.1545 (.2286)	-.3790 (.3764)
Other adult male	-.5206* (.2208)	.2354 (.3404)
Unemployed female	-.7788* (.4045)	.7733 (.9170)
Unemployed male	-.4020* (.2163)	.3975 (.7312)
Nonwhite	.1665 (.1129)	-.3554 (.2102)
SMSA	-.0227 (.0903)	.3467* (.1209)
South	.0920 .1037	.1922 .1583)
rho	-.3983* (.2061)	lambda -2.157 (1.547)

Standard errors in parenthesis
*Significant at the .05 level

NB The standard errors reported in column two are the OLS errors.

Table 3
Estimating the Probability of Participating in the Labor Market

	1 Structural Equation w/o Education	2 Structural Equation w/Education	3 Reduced Form Equation
Constant	-7.4736	-7.0845	-1.1868*
	(.3000)	(.4513)	(.1760)
Number of Children			
Aged: 0-2	-.2706*	-.3677*	-.3837*
	(.1041)	(.1477)	(.0557)
3-5	.2907*	.2848*	-.0934*
	(.1031)	(.1480)	(.0487)
6-9	-.0131	.0209	-.0425
	(.0545)	(.0763)	(.0435)
10-12	.0785	.0431	-.0442
	(.0732)	(.1010)	(.0542)
Nonlabor Income	-.8724*	-.9323*	-.4450*
	(.0639)	(.0935)	(.0459)
Predicted ln wage	5.8112*	13.5706*	—
	(.1995)	(.5904)	
Education	—	-.9290*	.0629*
		(.0466)	(.0119)
Predicted P_{cc}	-.7436*	-.5504*	—
	(.1724)	(.2475)	
Nonwhite	.0271	-.3101	.2946*
	(.1158)	(.1577)	(.0888)
SMSA	-.7477*	-1.949*	-.0382
	(.0780)	(.1346)	(.0567)
South	.3241*	.5383*	.1143
	(.0933)	(.1326)	(.0733)
Experience			.1720*
			(.0136)
Experience squared/1000			-3.9274*
			(.5368)
Presence of: Children 13-18			.7010
			(.0678)
Other adult female			.3647*
			(.1569)
Other adult male			.1595
			(.1338)
Unemployed female			-.4018
			(.2144)
Unemployed male			-.4991*
			(.1174)

Standard errors in parentheses
*Significant at .05 level

Footnotes

1. Hayghe, p. 45.

2. Of working women with children under 5, 7.2% care for the child while they are working. Source SIPP 1984 Topical Module 5. Calculation by author.

3. Despite the emphasis on the individual, the model is consistent with a household decision making framework. It can be shown that as long as the wages of both parents are independent of the number of hours worked, there is no perceived advantage to the child of having both parents share the care, and no parental utility is derived from child care, each family will choose one of its members as the "caregiving parent." The caregiving parent is the member of the family who will take responsibility for the care of the child if no market child care is used. The member chosen will be the one whose lifetime earnings are least affected by the contemplated interruption of labor force participation. If wages are an increasing function of hours worked the case is stronger for choosing one parent as caregiver. Families will contemplate splitting care only if both parents receive utility from hours spent in child care (presumably there is diminishing marginal utility of child care hours so that total utility would be increased if both parents participated). In this case the labor force decision of both parents should be modelled simultaneously along with the child care quality decision.

4. Parental quality is assumed to be equal to one.

5. In 1982, 28.9% of working mothers with their youngest child under 5 used a relative as the principal type of child care arrangement. Of these, one-half were unpaid or had a non-cash arrangements. Of those who used nonrelatives or day care centers, 4.8% report no cash payment. Even those who do pay their relative for child care may pay less than the market rate for child care. Source, O'Connell and Rogers, Tables A and 5.

6. We estimate the natural log of wages using a two stage Heckman procedure which corrects the sample selection bias. The independent variables used were education, experience, experience squared, dummy indicating nonwhite residence in the South and residence in on SMSA. The selection term was estimated from a reduced-form probit of participation.

7. Heckman (1974) does try to capture differences in expenditure by families based on the accessibility of informal care. He assumes that the price per unit of quality of child care was fixed in the market at one. Those with a female relative in the home or who had lived in the SMSA a long time were expected to face a price less than the market price. However, Heckman had no data on the actual amount paid for child care. He knew only if the family used formal or informal care. Blau and Robins (1988) have data on child care expenditures but they simply

assign the average expenditure on child care per child in the SMSA to each family in that SMSA. Their method makes no use of the micro data on expenditure per family and, thus, no recognition that families with more children or younger children should be expected to pay more.

8. Perhaps one might consider the marginal child care cost of the last hour worked but this number is impossible to calculate without knowledge of the work schedules of all family members and school schedules of school age children. In addition, it could be argued that average expenditure is more relevant than marginal since we are ultimately interested in the work/nonwork decision not the number of hours worked.

9. See Maddala p. 368.

10. The fifth wave includes child care expenditures and is the focus of our analysis. The third wave includes a work history module which is used to calculate work experience.

11. Our proxies for other potential categories do not include the possibility that one's grandmother lives close by, and as such, underestimate potential informal caregivers. However, these are the same variables that Blau and Robins (1988) use as a proxy for other potential caregivers. Heckman (1974) also included the length of residence in the SMSA. This variable was shown to have a negative effect on the quality adjusted price of child care. A variable of this type is unavailable in SIPP without more severe restrictions on the length of time one must have remain in the sample.

12. Total hours in the period is calculated as average hours of work per week times weeks worked with pay in the period. Wages for women with more than one job are the average of their wages in each job weighted by the hours worked per week in each job.

13. These are the coefficients from the bivariate probit of the determinants of participation.

14. All variables are evaluated at their mean levels.

15. Blau and Robins, p.380.

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