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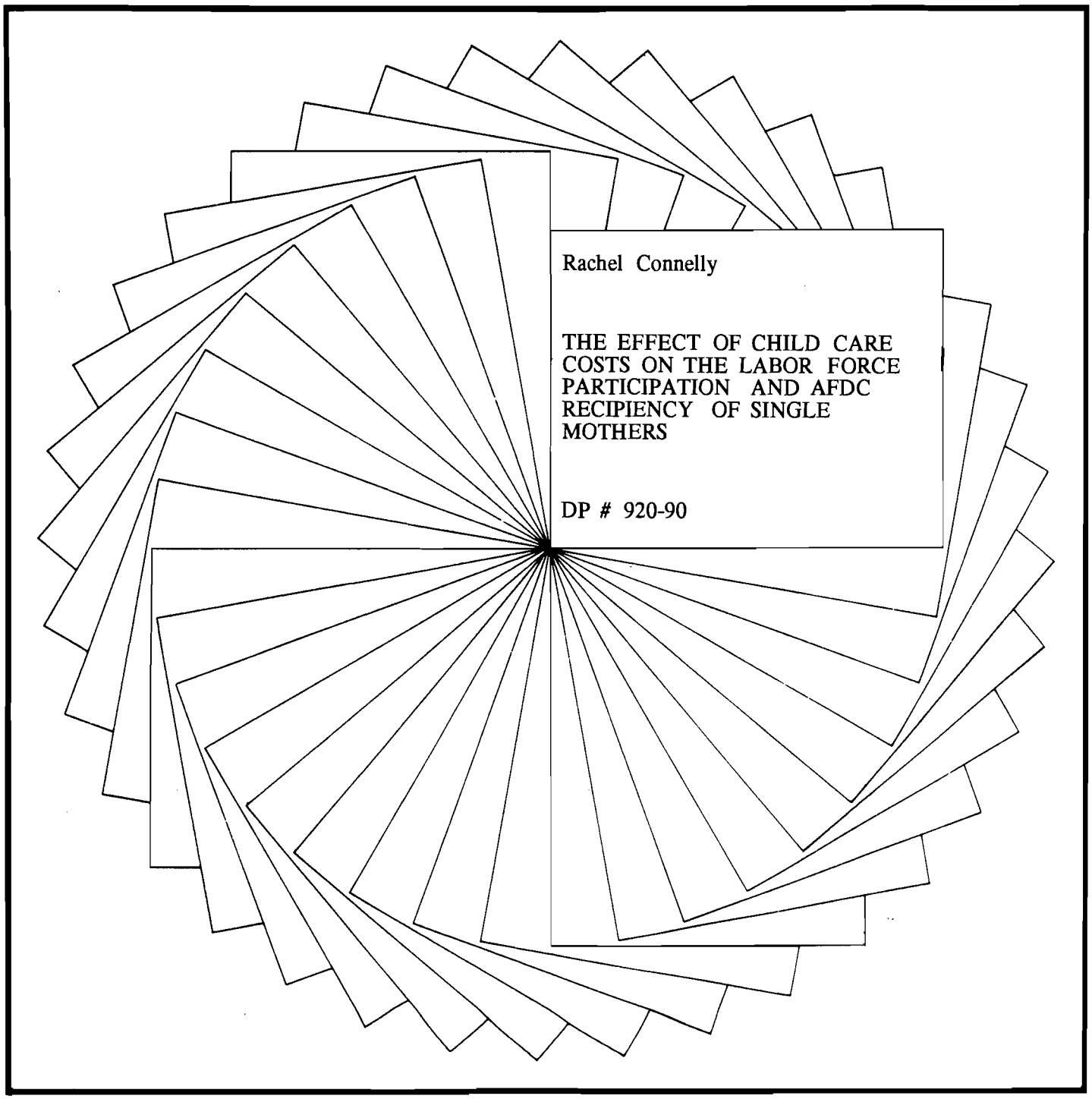

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The Effect of Child Care Costs on the Labor Force Participation and AFDC Recipiency of Single Mothers

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Abstract

This paper considers the effect of child care costs on two labor market decisions of single mothers--whether to participate in the labor market and whether to receive AFDC. Weekly child care expenditures are estimated for all women in the sample (taken from the 1984 Panel of SIPP), whether or not they are currently using nonmaternal child care. These expenditures are then included as an independent variable predicting the probability of AFDC recipiency and the probability of labor force participation. Results show substantial positive effect of child care costs on AFDC recipiency. Simulations based on these data from the mid-1980s show that AFDC recipiency is substantially reduced when child care expenditure is subsidized by 50 percent--not a large subsidy, in view of the fact that the average weekly expenditure on child care was about $14.00. The effect of child care costs on labor force participation is small after we control for their effect on AFDC recipiency.

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INTRODUCTION

For all mothers of young children, entering the labor market is strongly linked with the need for child care. Opportunities for caring for children while in the labor market are few in a developed economy. In some cases, the husband or another family member serves as caregiver, but for the vast majority of women workers with young children, the caregiver is someone outside the immediate family. For single mothers, the options for family care are diminished even further by the absence of a husband as a potential caregiver. The absence of the husband as potential caregiver means that single mothers face a higher average price of child care than married mothers, everything else held constant.

Since, for most women with children, the decision to enter the labor market is made in conjunction with purchasing child care, we expect labor force participation to depend in part on the cost of child care. Heckman (1974), Blau and Robins (1988), and Connelly (1989a) have explored the effect of child care costs on married women's labor force participation in the United States. Gustafsson and Stafford (1988) estimate the effect of such costs on the market work decision of the woman partner in two-parent families in Sweden. All find a significant negative effect of child care costs on married women's labor force participation. Connelly (1989b) compared the determinants of weekly child care expenditures for married and unmarried women with young children in the United States. Married and unmarried women were shown to differ substantially in the determinants of child care expenditures and in the effect of estimated child care costs on hours worked in the labor market. Unmarried mothers seem to be more sensitive to the price aspects of expenditures, while married mothers are more sensitive to the quality aspects. In estimating the labor supply equation it was found that predicted child care expenditures had a

negative effect on hours worked in the labor market by unmarried mothers but had no significant effect on married women's hours. Linking this finding with the comparisons of other variables in the labor supply function, Connelly concluded "that the labor supply of married women is more elastic with respect to child related factors while the labor supply of unmarried mothers is more elastic with respect to earnings related variables" (p. 20).

If unmarried women are more sensitive to price-related components of child care expenditures and to the amount of child care expenditures in determining hours worked in the labor market, then it appears that public policies designed to lower child care costs would have a greater impact on the labor market behavior of unmarried mothers than on that of married mothers. This should be good news to U.S. policymakers, because a substantial proportion (although still a minority) of single mothers are currently receiving AFDC payments (Aid to Families with Dependent Children, the major cash welfare program in the United States). One way to lower government expenditures on AFDC may be to subsidize the child care costs for all unmarried mothers of young children.[1] This paper seeks to measure the effectiveness of such a policy by explicitly considering the effect of the cost of child care on AFDC recipiency. It also explores the effect of the cost of child care on labor force participation, given the link between labor force participation and AFDC recipiency, for unmarried mothers. Increasing the cost of child care might be expected to lower labor market participation and increase AFDC recipiency. On the other hand, since child care expenses are a deductible work-related expense within the AFDC guidelines, we might expect no negative effect of the cost of child care on employment for AFDC recipients.

Like women's wages, child care costs present a problem for the researcher in that they are not known unless the woman is engaged in market work. The analysis of child care costs is complicated further by the fact that, even when the mother is employed, we observe only the family's total expenditure on child care. This figure may include expenses for more than one child

and/or for more than one type of child care arrangement per child. Thus, we cannot obtain a cost per hour per type of child care used. Even if the expenditure per hour per type of child care could be calculated, it would not be a price, since the price of child care differs by the level of quality and there is no measure of the level of quality purchased. See Deaton (1988) for a discussion of this problem in a very different context. Finally, even if we could calculate the price paid by parents per level of quality per hour, it would not be equal to the opportunity cost, since many families do not pay the "market price" for child care. Nonprofit centers are often subsidized in the form of free rent and require no return on investment capital. Relatives and friends may be willing to provide child care at a reduced price, either because they receive in-kind payments or because they enjoy caring for the child. In addition, although care given by a relative may be provided without money being exchanged, it is not without opportunity cost. To summarize, problems faced in the analysis of child care costs are:

1. Child care expenditures for all single mothers cannot be observed.
2. Observed expenditures are not equal to "price" of child care, since observed expenditures reflect differences in the number of children, the price paid per unit of quality, the level of quality purchased, and the number of hours of child care purchased.
3. "Market price" of child care is not equal to the price paid by parents, since some parents, have lower cost options available.
4. "Market price" of child care does not reflect the opportunity cost of care, since a sizable portion of child care is subsidized either directly by government programs or indirectly through nonprofit organizations.

How one approaches this set of problems depends, in part, on the information available, and, in part, on the question one is trying to answer. For this study, because it is concerned with the labor market participation and AFDC recipiency decisions of mothers and not with child

outcomes, the inability to divide expenditures among children within the family is not a problem. The mother's decision depends on total price of child care if she is employed--it is not necessary to know the cost per child. However, since it is expected that child care costs will differ by the number of children and the age of the children, I have controlled for these factors in estimating weekly child care expenditures. Also, since the focus is on the mother's decision, only the portion of the cost paid by her is relevant. Thus, for the purpose of this paper, we do not have to worry about the level of subsidy or the opportunity cost of a relative's time.

Differences among families in their access to low-cost or no-cost care is a pertinent issue. The problem is that there is no exogenously given price of child care, p. Instead, owing to differences in family circumstances and location of residence, each individual faces an exogenously given p_i. The approach I use to deal with this problem follows from Heckman (1974), who estimated a price of child care for each woman given information about the availability of other potential caregivers. Heckman did not, however, consider differences in the quality of care chosen. If we include the possibility of quality differences, then to the extent that differences in expenditures are due to differences in quality, the p_i's are no longer exogenous. Parents choose the level of quality purchased along with their decision of whether to participate in the labor market. The dataset used does not include any measures of the quality of care used, and recall that expenditures may refer to more than one type of care per family. Instead, two variables which are thought to be correlated with the quality of care purchased are used: the education of the mother and the level of nonlabor income in the family. These variables serve as proxies for the endogeneity of quality choice. Thus, the approach used is to estimate weekly expenditures for each unmarried mother, including variables thought to affect the quantity of care purchased, the quality of care purchased, and the price of care to family i.

The problem of censored data is handled by using the methodology developed in Connelly (1989a, 1989b). Child care costs are estimated using information from those women who are currently employed, taking into account both the selection in the participation decision and the large number of women who are employed but whose money cost of child care is zero. The results of this estimation allow us to predict, for each woman, an expected child care expenditure if she were to participate in the labor market. This estimated child care expenditure incorporates family-specific variables such as the number and ages of children, the location of residence, the presence of other potential caregivers, and possible differences in the demand for quality. This is the relevant variable to include in equations estimating the probability of receiving AFDC and the probability of participating in the labor market, since it represents the true child-care-related cost of employment for the individual woman.

With an estimate of child care expenditures we can analyze how changes in the price of child care might alter the probability of participating in the labor market and the probability of being an AFDC recipient. We can also simulate "tied" programs, such as increased child care subsidies enacted in conjunction with lowered AFDC benefits. Because the estimated child care cost includes the cost of additional children in the family, the effect of an additional child due to increased child care costs from the effect of an additional child on the opportunity cost of a mother's time can be separated. The results presented below suggest that even mothers of very young children will respond to a decreased price of child care by decreasing their recipiency of AFDC.

Following is a description of the data used in the empirical analysis and a brief discussion of the methodology used to estimate child care costs; a presentation of the strategy for jointly estimating the probability of receiving AFDC and the probability of participating in the labor market; the results of that estimation process; and concluding comments.

I. DATA

The sample of single mothers used in this paper comes from the 1984 Panel of the Survey of Income and Program Participation (SIPP). Conducted by the U.S. Bureau of the Census, SIPP covers a nationally representative sample of approximately 16,000 households. SIPP respondents are interviewed every four months for three and one-half years. In the fifth interview, which was collected between January and April of 1985, currently employed respondents with children younger than 15 were asked for their typical weekly expenditures on child care for the previous month. We limit our analysis to women with children younger than 13 as the population for whom a child's time constraint might be binding.[2] We exploit the longitudinal aspect of the data to the extent that information gathered in the third interview on work experience and educational attainment is added to the main set of variables from the fifth interview. As a result we limit our analysis to single women, 21-55, with children under age 13, who were present in the sample from the third through the fifth interviews. Of the 724 women in this category, 27 percent are AFDC recipients, 16 percent of the AFDC recipients are employed in the labor market, and 80 percent of the nonrecipients are employed.

Table 1 presents the mean values of the variables included in the analysis for these four categories of single mothers. Looking at Table 1 we see that AFDC recipients are slightly younger than nonrecipients and have almost a year less education. AFDC recipients have more children aged 0-18 and more young children than nonrecipients, and nonparticipants in the labor market in either recipiency category have more infants than do participants. AFDC recipients are more likely than nonrecipients to be nonwhite and less likely to be urban.

Table 1 also includes a measure of the average estimated weekly expenditures on child care for each category of single women. This variable is predicted on the basis of estimated

Table 1

Selected Mean Characteristics of Single Mothers Aged 21-55 with at Least One Child under Age 13

	AFCD Recipients		Non-AFCD Recipients	
	Participating in the Labor Market	Not Participating in the Labor Market	Participating in the Labor Market	Not Participating in the Labor Market
Age (years)	32.00	30.61	32.38	33.00
Education (years)	11.53	11.45	12.60	11.42
Work experience (years)	7.84	5.63	10.72	8.09
Predicted child care expenditure (weekly $)	11.14	15.77	13.41	13.04
Number of children				
aged 0-2	.16	.30	.15	.26
3-5	.41	.48	.33	.35
6-12	1.09	.97	.89	.99
13-18	.50	.55	.46	.36
Proportion nonwhite	.47	.43	.35	.30
Proportion living in SMSA	.72	.77	.80	.80
Proportion living in				
Northeast	.28	.17	.23	.34
Central States	.25	.39	.24	.18
South	.38	.25	.35	.32
Number	32	164	423	105

Source: Calculations based on data from the 1984 Panel of the Survey of Income and Program Participation.

coefficients from a model of the determinants of weekly child care expenditures designed to account for differences in price, quality, and hours used. Weekly child care expenditures were assumed to be a linear function of a set of individual and family and locational variables, which includes education, work experience, the predicted hours worked of the mother, and the presence of other potential caregivers in the family. Also included in the regression is a sample selection term which accounts jointly for expenditure data being limited to those currently participating in the labor market and for the large percentage of employed mothers reporting zero weekly expenditures on child care.

The statistical technique used to predict individual child care expenditure involved estimating a simultaneous equation system in which the dependent variables are hours worked, t_m, and weekly expenditures, Expend. Both variables frequently take on the value of zero and thus require a tobit specification. In addition, because of the survey design the latter variable, Expend, is observed only if the respondent is currently employed. The two equations are estimated with a two-stage procedure analogous to two-stage least squares, which accounts both for the lower-bound censoring that results from the large proportion of zeros and, in the case of Expend, the censoring that results from the survey design. Appendix Table A presents the estimated coefficients for single mothers' weekly child care expenditures. See Connelly (1989b) for a more detailed explanation of the statistical methodology.

The coefficients estimated in this two-stage procedure are then used with the individual woman's characteristics to predict the child care expenditures she would face if she were to participate in the labor market. The value reported is the expected value of weekly child care expenditure conditional on participating in the labor market, E[Expend|Part=1]. This is the expenditure measure we want, since it measures the amount that would be paid for child care if the mother chooses to participate in the labor market. Table 1 shows that nonrecipients would

pay approximately $13 a week on child care regardless of their current participation status. Nonparticipating AFDC recipients would pay substantially more per week if they worked in the labor market. Participating AFDC recipients pay less, approximately $11 a week.[3]

II. ESTIMATION STRATEGIES

We begin with a simple model of individual decision making that leads to the discrete choices about AFDC recipiency and labor force participation of mothers with young children. We assume that mothers of young children seek to maximize their utility over goods, X, and child services, CS (equation 1), subject to a money budget constraint (equation 2), a production function for child services (equation 3), a mother's time constraint (equation 4), and a child's time constraint (equation 5):

$$\max U = U(X,CS) \tag{1}$$

subject to

$$wH + Y - p_{cc}t_{cc} = X \tag{2}$$

$$CS = f(t_Q) \tag{3}$$

$$t_Q + H = T \tag{4}$$

$$t_Q + t_{cc} \leq T \tag{5}$$

where w is the mother's wage, Y is total nonlabor income, and p_{cc} is the price per hour of child care. A mother's time is divided between time spent with her children, t_Q, and time in the labor

market, H. A child's time is divided between time with the mother, t_Q, and time in child care, t_{cc}. We allow the child's time constraint to be nonbinding.

Total nonlabor income is the sum of family income from sources other than the mother's labor market participation and transfer income. If the mother does not receive AFDC payments, Y = Yother. If she does receive AFDC payments, Y = Yother + AFDC. Although the regulations determining AFDC payments are quite complicated and vary from state to state, we can model the basic structure of the formula as a guarantee level, G, minus the net income from labor market participation:

$$AFDC = G - (wH - p_{cc}t_{cc}) \tag{6}$$

Of importance to our analysis of the effect of child care costs on AFDC recipiency and labor force participation is the fact that child care costs are considered work-related expenses and are fully deductible from gross wages in the calculation of benefits.[4]

The decision to participate in the AFDC program depends on the relative maximum utility available to the single mother on and off the program. If the child's time constraint is assumed to be binding, $t_{cc} = H$, and the indirect utility function on AFDC is $V_a = V(w, Yother + \delta G)$, where δ the coefficient allows for a different level of utility from transfer income than from nontransfer income.[5] Still assuming the child's time constraint is binding, the indirect utility function of not receiving AFDC is $V_{na} = V(w - \alpha p_{cc}, Yother)$. The coefficient α allows for the possibility that time in child care may enter the child services production function or that increased income may change the quality of child care demanded, thus changing the price per hour.

A mother of young children will choose to receive AFDC if

$$A^* = V_a - V_{na} - S > 0 \tag{7}$$

where S corresponds to the flat sigma component of Moffitt (1983) and is expected to depend on individual characteristics of the mother.[6] Including all the components of V_a, V_{na}, and S in a reduced-form equation, we can rewrite equation (7) as

$$A^* = Z\pi + U1 \tag{8}$$

Included among the Z variables will be predicted child care expenditures, which are expected to be positively related to A^*. Increased expenditures on child care lower a woman's effective wage in the labor market when she is not receiving AFDC. Also included among the Z variables will be factors affecting a woman's wage[7] and factors affecting the value of a woman's time at home, as well as state-specific AFDC guarantees and other variables proxying for differences in the location of residence. We expect that variables that are positively correlated with wages, such as years of education and work experience, will be negatively correlated with A^*, while those variables that are positively correlated with the value of a mother's time at home, particularly the number of young children in the family, will be positively correlated with A^*.

While the actual value of A^* is not observed, we do observe a dichotomous variable A, which records whether someone is currently receiving AFDC income:

$A = 1$ where $A^* > 0$

$A = 0$ otherwise

We can, therefore, estimate equation (8) using a standard probit estimation, assuming that U1 is a normally distributed random variable. The estimates of equation (8) will provide an initial look at the effect of child care costs on AFDC recipiency. However, estimating equation (8) alone ignores the interaction between AFDC recipiency and labor market participation. Because of kinks in the budget line caused by AFDC regulations, as well as possible discontinuities in hours

of employment available and hours of child care available, it is reasonable to suspect that decisions about AFDC recipiency are made jointly with decisions to participate in the labor market.

Let P^* represent the latent continuous variable measuring the propensity to participate in the labor market. Then we can write the reduced-form participation equation as

$$P^* = XB + U2 \tag{9}$$

Our hypothesis is that U2 is correlated with U1 of the AFDC equation. Jointly estimating equations (8) and (9) is accomplished by estimating a bivariate probit with four possibilities: ($A^* > 0$, $P^* > 0$); ($A^* > 0$, $P^* < 0$); ($A^* < 0$, $P^* > 0$); and ($A^* < 0$, $P^* < 0$). These categories correspond to the four groups in Table 1. Estimates of the bivariate probit refine our understanding of the effect of child care expenditures on both AFDC recipiency and labor force participation of single mothers.

A potential problem with estimating equations (8) and (9) jointly is that the procedure assumes that the effect of the X variables on P^* is the same whether or not an individual is receiving AFDC. However, because of the deductibility of child care expenses as a work-related expense within AFDC, we might expect that the level of child care expenditures will have a different effect on labor market participation depending on one's AFDC recipiency status. Other variables, particularly those thought to be related to the wage rate, may also be expected to differ in their effect on participation depending on recipiency status. Since an increase in the wage rate leads to a substantial decrease in the AFDC benefits, we expect that variables affecting the wage will have little impact on labor force participation while on AFDC.

To allow for these differences we can rewrite equation (9) as

$$(P^* | A=1) = XB1 + U2a \tag{10}$$

$$(P^* | A=0) = XB2 + U2b \tag{11}$$

The system is now essentially a switching probit model. Equation (8) switches us from (10) to (11). We estimate (8), (10), and (11) using a maximum likelihood procedure. The likelihood equation to be estimated is

$$L = \underset{A=1,P=1}{\Pi F(Z\pi, XB1, \rho_{12a})} \; \underset{A=1,P=0}{\Pi F(Z\pi, -XB1, -\rho_{12a})}$$

$$\underset{A=0,P=1}{\Pi F(-Z\pi, XB2, -\rho_{12b})} \; \underset{A=0,P=0}{\Pi F(-Z\pi, -XB2, \rho_{12b})} \tag{12}$$

where ρ_{12a} allows for the correlation of U1 and U2a, and ρ_{12b} is the correlation coefficient for U1 and U2b.

The next section presents the estimates of the models described above. First the univariate probit on AFDC recipiency is reported. These results are compared to estimates of the bivariate probit to assess the impact of the joint decision making concerning labor force participation and AFDC recipiency. Finally, the results from equation (12) are presented, which allow for differing coefficients of participation depending on recipiency status. In each case we are especially interested in the effect of child care expenditures on the probability of participating in the labor market and of receiving AFDC. We are also interested in the effect that controlling for child care expenditures has on the coefficients of the number of young children in the family. In other words, does the presence of young children increase the probability of AFDC recipiency and

decrease the probability of labor force participation once we control for the fact that women with young children face higher child care costs and are more likely to face a binding child's time constraint?

III. ESTIMATION RESULTS

Table 2 presents the results from the probit estimation in which the dependent variable is AFDC recipiency as of the last month of the fifth wave of SIPP interviews. Very similar results have been obtained from other data sets.[8] Table 2 shows that single mothers with higher levels of education, more years of work experience, and higher levels of nonlabor income are less likely to receive AFDC. Nonwhite mothers are more likely to receive AFDC; mothers who reside in urban areas are less likely to receive AFDC. State AFDC guarantee levels are significantly related to AFDC recipiency. Controlling for state guarantee levels, those women living in the South and Central portions of the United States are more likely than those living in the Northeast or the West to receive benefits.

The new finding of Table 2 is the effect of predicted child care expenditures on the probability of AFDC recipiency. That effect is positive and significant, as the model predicted. In addition, once child care costs are controlled for, the number of children in each of the age categories has no effect on the probability of recipiency.[9] Thus, while the net effect of increased numbers of young children is positive, as measured in a probit estimation that excludes child care expenditures, the increased probability of AFDC recipiency of mothers of young children is explained by the increased child care costs young children require. Surprisingly enough, this result even holds for women with infants.

To further explore the relationship between child care costs and single mothers' decision making, Table 3 presents the results of jointly estimating AFDC recipiency and labor force

Table 2

Probit Estimates of the Probability of AFDC Recipiency

	Coefficient	Std. Error	Mean of X
Constant	-0.356	(2.37)	1.00
Education	-12.947	(3.17)	0.122
Work experience	-2.137	(0.28)	0.906
Work experience squared	5.523	(0.98)	0.122
Nonlabor income	-0.020	(0.007)	5.226
Number of children			
aged 0-2	-0.059	(0.19)	0.202
3-6	-0.361	(0.26)	0.370
6-12	0.022	(0.09)	0.934
13-18	0.088	(0.10)	0.471
Predicted child care expenditure	0.024	(0.01)	13.792
Nonwhite	0.588	(0.15)	0.365
Residence in			
Northeast	-0.017	(0.26)	0.233
Central States	0.749	(0.19)	0.264
South	0.621	(0.28)	0.326
Residence in SMSA	-0.340	(0.15)	0.790
Cost of living in state of residence	0.005	(0.01)	225.13
AFDC maximum benefit in state of residence	0.245	(0.07)	3.33
Log likelihood	-321.43		

Notes: Education is number of years of education completed, divided by 100. Work experience is number of years in which the respondent had worked at least 6 months, divided by 10. Work experience squared is divided by 1000. Non-labor income is total family income minus the woman's earnings minus transfer income. This number is then divided by 100. Cost of living in state of residence comes from Fournier and Rasmussen (1986). It is the estimated intermediate cost of living in state, divided by 100. AFDC maximum benefit is calculated from U.S. House of Representatives (1985), given the state of residence and the reported number of children in the family. This number is divided by 100.

Table 3

Bivariate Probit Estimates of Probability of AFDC Recipency and Labor Force Participation

	Probability of AFDC Recipiency		Probability of Labor Force Participation	
Constant	-0.478	(2.82)	-2.249	(2.31)
Education	-13.058	(3.10)	16.552	(2.78)
Work experience	-2.044	(0.28)	1.964	(0.24)
Work experience squared	5.436	(1.00)	-5.427	(0.82)
Nonlabor income	-0.018	(0.006)	-0.0005	(0.007)
Number of children				
aged 0-2	-0.029	(0.20)	-0.199	(0.20)
3-5	-0.274	(0.26)	0.120	(0.24)
6-12	0.021	(0.09)	-0.124	(0.09)
13-18	0.044	(0.09)	-	-
Predicted child care expenditure	0.0199	(0.011)	-0.0153	(0.0096)
Nonwhite	0.537	(0.15)	-0.225	(0.13)
Residence in				
Northeast	0.027	(0.30)	-0.169	(0.25)
Central	0.734	(0.20)	-0.330	(0.19)
South	0.668	(0.31)	-0.175	(0.27)
SMSA	-0.321	(0.15)	0.015	(0.15)
Cost of living	0.005	(0.01)	0.002	(0.01)
AFDC maximum benefit	0.250	(0.08)	-0.129	(0.066)
ρ	-.741	(0.043)		
Log likelihood			-640.39	

Note: Standard errors in parentheses.

participation. As expected, the estimated correlation coefficient between U1 and U2 is negative and significant. This suggests that unobserved factors which increase the probability of participating in the labor market decrease the probability of receiving AFDC. The point estimate of -.74 indicates a substantial interaction between the two decisions.

Despite the large and significant negative correlation, the coefficients of the AFDC equation are basically unchanged from those reported in Table 2. The coefficient on predicted child care expenses is estimated slightly less precisely but is still significant at the .1 level.

The coefficients that relate to the probability of labor force participation are in keeping with our expectations. Holding other variables constant, single mothers with higher levels of education and more years of work experience are more likely to participate in the labor market. Nonlabor income has no significant effect on the probability of participating, while higher AFDC guarantees significantly lower the probability of participating. The urban/rural variable has no effect on participating, but women who live in Southern states are less likely to participate (perhaps because of lower wages).

The effect of predicted child care expenditures is negative, as predicted. However, it is not significant at conventional levels (it is significant at the 10 percent level if we use a one-tailed test). The presence of child care costs in the estimation does have the effect observed in the AFDC equation of making the coefficients on the number of young children in the family insignificantly different from zero.[10]

In the previous section we hypothesized that the likelihood function estimated for Table 3 might be overly restrictive in that it required the coefficients on labor force participation to be the same regardless of AFDC recipiency status. Table 4 presents the results of estimating the switching probit, equation (12), which allows the coefficients of X to differ depending on whether the respondent is receiving AFDC or not. The estimates of the AFDC coefficients continue to

Table 4

Maximum Likelihood Estimates of Equation 12

	Probability of Labor Force Participation if AFDC = 1 B1		Probability of Labor Force Participation if AFDC = 0 B2	
Constant	-5.979	(0.63)	-0.059	(0.29)
Education	0.124	(0.04)	12.234	(1.80)
Work experience				
Work experience squared	1.055	(0.41)	-2.438	(0.32)
Nonlabor income	-0.003	(0.01)	-0.014	(0.008)
Number of children				
aged 0-2	0.120	(0.17)	-0.430	(0.17)
3-5	0.357	(0.25)	-0.136	(0.23)
6-12	0.132	(0.08)	-0.137	(0.10)
Predicted child care expenditure	-0.0161	(0.01)	0.003	(0.01)
Nonwhite	-0.154	(0.13)	0.287	(0.14)
Residences in				
Northeast	0.141	(0.22)	-0.117	(0.15)
Central	0.393	(0.19)	12.168	(0.03)
South	0.885	(0.16)	0.133	(0.16)
SMSA	-0.167	(0.10)	-0.174	(0.17)
Cost of living	0.017	(0.00)	-0.004	(0.001)
AFDC maximum benefit	0.057	(0.06)	0.107	(0.07)
ρ	0.795	(0.23)	0.633	(0.27)
Log likelihood			-990.43	

Note: Standard errors in parentheses. See Appendix Table B for AFDC coefficients estimated jointly with coefficients above.

be very robust and are similar to those presented in Tables 2 and 3. These coefficients are reported in Appendix Table B. The standard errors on these coefficients are reduced from those of Table 3, making nearly all the coefficients significantly different from zero. Of interest is that predicted child care expenditures continue to exert a significant positive effect on AFDC recipiency. Once we control for the cost of child care, the number of young children in the family no longer increases the probability of recipiency. In fact, the number of children 3-5 years old in a family is shown to slightly decrease the probability of recipiency once we have controlled for the cost of child care.

The coefficient vectors B1 and B2 are substantially different from one another. B1 is the effect of the X variables on the probability of participation in the labor market if the woman is receiving AFDC. B2 measures the effect of the X variables on the probability of participating in the labor market if the woman is not receiving AFDC. In Table 4, looking at the estimates of B2, the standard determinants of women's labor force participation: the educational level of the woman, and her years of work experience, continue to have the expected significant effects on labor market participation for those not receiving AFDC. The magnitudes of these coefficients are similar to those reported in Table 3. The number of children 0-2 also has a negative effect on the probability of participation when not receiving AFDC. However, predicted expenditures on child care are not significantly related to the probability of participating in the labor market, now that we have allowed the coefficients to differ between equations (10) and (11).

Comparing these results to those of B1, we see that the number of years of education and work experience have almost no effect on the probability of participating in the labor market while receiving AFDC. The education coefficient in column 1, while significant, is 1/100 the size of the coefficient in column 2. The only factors that seem to have any effect on the probability of participating in the labor market while receiving AFDC are the locational variables. Women

living in the Central or Southern states have a higher probability of being employed while receiving AFDC than do women in the Northeastern or Western states. Single mothers living in an SMSA have a lower probability of participating, and those mothers who live in states with a high cost of living have a slightly higher probability of participating. With the exception of the small positive effect of education and a negative effect of years of work experience, none of the individual or family characteristics included significantly increases the probability of working while receiving AFDC. On reflection this is not too surprising, since AFDC recipients are subject to a large set of regulations which affect the attractiveness of labor market participation. These regulations vary from state to state, thus explaining the importance of the locational variables over individual or family characteristics. In addition, the effect of the changes in welfare regulations in 1981 and 1983 was to remove work incentives from the program. The effect of removing them is reflected in the lower proportion of AFDC recipients who participated in the labor market than was reported by either Moffitt (1983) or Blank (1985).[11] But it can also be seen in the lack of explanatory power of the individual and family characteristics included in this estimation.

An extremely surprising finding in Table 4 is the positive and significant correlation coefficients between U1 and U2a and between U1 and U2b.[12] A possible explanation comes from the apparent importance of regulation rather than individual characteristics in determining labor force participation within AFDC. Consider one's knowledge of the regulations as an unobserved variable that might affect AFDC recipiency and labor force participation. A better understanding of the regulations should increase the probability of receiving AFDC, but it might also increase the probability of participating in the labor market if knowing the rules increases one's total benefit payment, leading to a positive correlation between U1 and U2a. The positive correlation between U1 and U2b implies that the unobserved characteristics which increase the probability of AFDC participation also increase the probability of labor market participation if

one is not on AFDC. Again, this may be understood as capturing "knowledge of the system"--those who could benefit from AFDC do so, and those with more "knowledge of the system" who would not benefit from AFDC use this knowledge to help find employment. The positive correlation of both U1 and U2a and U1 and U2b is not inconsistent with the negative correlation of U1 and U2 reported in Table 3, since the former represents correlations conditional on AFDC recipiency status while the latter represents the unconditional correlation between AFDC recipiency and labor force participation.

Although the results from Table 4 cast doubt on the extent to which child care costs affect labor force participation, they continue to show strong evidence of a positive relationship between predicted child care expenditures and AFDC recipiency. Table 5 presents a set of simulations designed to assess the impact of child care subsidies on the probability of AFDC recipiency and on government expenditures. The simulations were done using the coefficient estimates of Table 2 and the actual characteristics of the 724 women in the sample. Column 1 shows that using the predicted child care expenses and the other actual characteristics of women in our sample, 20 percent of the women are predicted to receive AFDC. If child care expenditures were one-half of their predicted level, AFDC recipiency falls to 13 percent. With no-cost child care for single mothers, AFDC recipiency would fall further to 11 percent. Simulations 3 and 4 explore a "tied" policy in which child care expenditures are cut in half and AFDC guarantees are also reduced. The outcome of simulation 3, in which AFDC benefits are reduced by 20 percent, duplicates the results of simulation 2, in which child care was available at no cost. When AFDC benefits are cut further in simulation 4, predicted AFDC recipiency falls still further, to 8 percent. These results indicate that subsidizing child care costs for all single mothers may be an important policy tool leading to lower AFDC recipiency rates.

Table 5

Simulation Results

	Predicted Percentage Receiving AFDC[a]	Percentage of Monthly AFDC Bill Saved[b]	AFDC Saving as Percentage of Subsidy Cost[c]
Using Sample Values	20%	--	--
Simulation			
1. Predicted CC Expenditure x .5	13	29	64
2. No Cost Child Care	11	42	47
3. Predicted CC Expenditure x .5 and AFDC Maximum Benefit x .8	11	56	124
4. Predicted CC Expenditure x .5 and AFDC Maximum Benefit x .7	8	71	158

Note: Simulations use coefficients estimated from Table 2 and actual values of independent variables for each woman.

[a]For each woman we calculate the probability of receiving AFDC; if Pr > .5 she is predicted to be receiving AFDC.

[b]Monthly AFDC payments are predicted for each woman predicted to be receiving AFDC. Total monthly AFDC payments are then calculated and compared with the total predicted monthly AFDC payments using the sample values.

[c]Total cost of the child care subsidy is calculated from predicted child care costs for all individuals in the sample. Figure in table is AFDC savings divided by the subsidy cost.

Column 2 shows the estimated savings in the total AFDC expenditures which would result from the lower AFDC recipiency rates. The saving in AFDC expenditures is calculated by estimating total AFDC expenditures with and without the subsidy. An AFDC monthly benefit was predicted for each woman in the sample who was predicted to be an AFDC recipient. Estimates take into account the number of children in the family in five age categories, but not the state of residence.[13] Results of this procedure show, for example, that reducing AFDC recipiency from 20 percent to 13 percent would save 29 percent of total AFDC expenditures.[14]

Column 3 of Table 5 is a rough estimate of the net cost of the child care subsidy. The number in column 3 represents AFDC savings as a percentage of the cost of the subsidy. For example, in simulation 1, the savings from the reduced AFDC caseload are 64 percent of the cost of subsidizing by 50 percent the child care costs of all single mothers. This estimate ignores additional possible savings, such as reduced Medicaid and Food Stamp expenditures, and the increased government revenues from income taxes resulting from increased labor force participation. Even ignoring these additional cost savings, for policies 3 and 4 the savings on AFDC expenditures are shown to more than cover the cost of child care subsidy. The results of column 3 show that the net cost of the program need not be positive, since lower recipiency rates make up for the cost of the child care subsidy. Even without a reduction in AFDC benefits, the cost of subsidizing child care for single mothers appears to be very low due to the savings from lower recipiency rates.

IV. SUMMARY OF RESULTS

Single mothers differ from married mothers in the absence of the husband as a potential caregiver, in the absence of husband's income (except in the case of child support), and, in the United States, in the single mother's categorical eligibility for AFDC. Several papers have

examined the effect of child care costs on the labor market decisions of married women (see Heckman, 1974; Blau and Robins, 1988; Connelly, 1989a; Gustafsson and Stafford, 1988). This is the first paper that looks specifically at the effect of child care costs on the decisions of single mothers concerning labor force participation and AFDC recipiency. In doing so, it seeks to answer the policy question made so relevant by the Family Support Act of 1988, "Can subsidizing child care reduce the dependence of single mothers on AFDC?"

The answer seems to be an unequivocal yes. The results of the positive effect of predicted child care costs are robust to changes in the specification of the child care expenditure estimation and changes in the specification of the AFDC probit. The results remain when we jointly estimate the probability of AFDC recipiency with the probability of labor market participation. Simulations show that AFDC recipiency is reduced substantially when child care expenditures are subsidized by 50 percent. While that sounds like a large subsidy, recall that the average weekly expenditure on child care is about $14.

The effect of predicted child care expenditures on labor force participation is less certain. Connelly (1989b) found a significant negative effect of predicted child care expenditures on hours worked in the formal labor market of single mothers. In this paper, the joint estimate of AFDC recipiency and labor force participation resulted in a negative effect of child care expenditures on the probability of participation when the coefficients determining labor force participation within AFDC were constrained to be the same as those outside of AFDC. I suspect, however, that child care expenses would have little, if any, effect on labor force participation within AFDC, since child care expenses are fully deductible work-related expenses. When we allow the coefficient vectors to differ, child care expenses are then unrelated to labor force participation within AFDC, but child care expenses are also unrelated to labor force participation outside AFDC.

The results of this analysis cannot be used to predict the entire effect of the Family Support Act or of a comprehensive child care bill. These large pieces of legislation change the very rules under which single mothers live. But the results do indicate that single mothers are sensitive to child care costs in AFDC recipiency and perhaps in labor force participation. In addition, we have seen that almost the entire effect of young children on increasing AFDC recipiency and decreasing labor force participation is the result of increased child care expenditures faced by these women and not the result of differences in the preferences of women with young children to work at home or differences in the value of the mother's time at home.

Notes

[1]The recently enacted Family Support Act of 1988 includes a provision for child care subsidies to be extended to mothers of young children for one year after leaving the AFDC program. Many states claim that this will simply divert current child care subsidies away from working mothers to AFDC mothers and may lead to a cycle of AFDC-employment-AFDC.

[2]A child's time constraint assumes that young children must be cared for at all times either by the parent or by a child care provider.

[3]These average weekly expenditures are so low because many women are expected to pay close to zero for child care. These women may have only older children or they may have a relative at home who cares for young children.

[4]Child care expenses are actually fully deductible only to a maximum of $160 a month, so to be more precise equation (6) should be $AFDC = G - (wH - \max\{p_{cc}t_{cc}, 40\})$. The effect of this is that child care costs may affect labor force participation within AFDC, but we would expect the effect to be smaller than on labor force participation outside of AFDC.

[5]This is equivalent to the variable stigma component of Moffitt (1983).

[6]Also see Blank (1985, 1989) for models employing this indirect utility approach to AFDC recipiency.

[7]As we do not observe wages for many of the women in the sample, we simply include among the Z variables those variables thought to determine wages.

[8]Graham and Beller (1989) use the 1979 and 1982 March CPS; Blank (1989) uses the National Medical Care Utilization and Expenditure Survey.

[9]Blank (1989) found that the number of children under age 6 significantly increased the probability of AFDC recipiency. Graham and Beller (1989) found that the number of children under age 18 significantly increased the probability of AFDC recipiency, and the number of those children who

were under 6 increased the probability still more. Using our SIPP sample, I ran a reduced reduced-form in which child care expenditures were excluded and all the determinants of child care expenditures were included. The results of this reduced-form were that the coefficients on the number of children aged 0-2, 3-5, and 6-12 were all significantly greater than zero at the 10 percent level.

[10]In the reduced-reduced form equation described in the note above we find that, without child care expenditures, the number of children ages 0-2 and 6-12 have a significant negative impact on the probability of participation. The magnitude of the coefficient on infants is twice as large in absolute value as the one reported in Table 3.

[11]Moffitt using the 1976 wave of the PSID, reports an employment rate among AFDC recipients of 25 percent. Blank, using the 1979 March CPS, also reports an employment rate among recipients of 25 percent. Our employment rate in 1985 is 16 percent.

[12]This result occurred no matter what starting value was used for ρ and was quite robust to changes in the specification of the equations.

[13]Sample sizes are much too small to include 50 state dummies.

[14]Monthly AFDC payments are predicted by regressing the number of children aged 0-2, 3-5, 6-9, 10-12, and 13-18 on the actual AFDC payments for women currently receiving AFDC. No sample selection correction was attempted since this is already of necessity a rough estimate. The results were

$$\begin{aligned} AFDC = {} & 208.67 + \underset{(25.06)}{53.86}\,Num02 + \underset{(22.16)}{43.79}\,Num3\text{-}5 \\ & + \underset{(16.24)}{47.75}\,Num6\text{-}9 + \underset{(18.93)}{39.79}\,Num10\text{-}12 + \underset{(13.27)}{55.59}\,Num13\text{-}18. \end{aligned}$$

Estimated coefficients were then multiplied by actual sample observation for women predicted to receive AFDC. Predicted versus actual AFDC payments were compared for those women who

were both actually receiving AFDC and who were predicted by the model to be receiving AFDC. The predicted values were quite similar to the actual values for this subsample, providing us with some confidence in this procedure.

Appendix A

Determinant of Desired Weekly Family Expenditure on Child Care: OLS Estimation

	Single Mothers	
Constant	-88.52	(57.24)
Predicted hours	0.57	(0.27)
Number of children		
aged 0-2	19.59	(7.24)
3-5	17.94	(11.91)
6-12	8.61	(2.90)
Education	-0.71	(1.05)
Nonlabor income[a]	-0.015	(0.09)
Nonwhite	-9.85	(3.69)
Presence of		
Children 13-18	-1.85	(7.77)
Other adult females	14.80	(7.52)
Other adult males	-16.72	(7.11)
Nonemployed females	-11.25	(11.16)
Nonemployed males	16.21	(9.49)
SMSA	7.19	(4.03)
Cost of living in state of residence (thousands of $)	0.43	(0.25)
Residence in		
Northeast	-5.32	(6.61)
Central	-1.54	(4.43)
South	3.17	(8.77)
λ	1.53	(17.25)
N	168	

Note: Uncorrected OLS standard errors in parentheses.

[a]Nonlabor income is proxied by monthly property income.

Appendix Table B

Maximum Likelihood Estimates of Probability of AFDC Recipency from Equation 12

	Probability of AFDC Recipiency	
Constant	-0.197	(0.06)
Education	-12.331	(0.17)
Work experience	-2.282	(0.21)
Work experience squared	5.775	(0.71)
Nonlabor income	-0.018	(0.007)
Number of children		
aged 0-2	-0.092	(0.14)
3-5	-0.440	(0.19)
6-12	0.076	(0.08)
13-18	0.110	(0.08)
Predicted child care expenditure	0.027	(0.008)
Nonwhite	0.611	(0.12)
Residence in		
Northeast	0.024	(0.13)
Central	0.941	(0.15)
South	0.595	(0.16)
SMSA	0.382	(0.10)
Cost of living	0.004	(0.001)
AFDC maximum benefit	0.245	(0.05)

Note: Standard errors in parentheses. This vector of coefficients was jointly estimated with B1 and B2 of Table 4.

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