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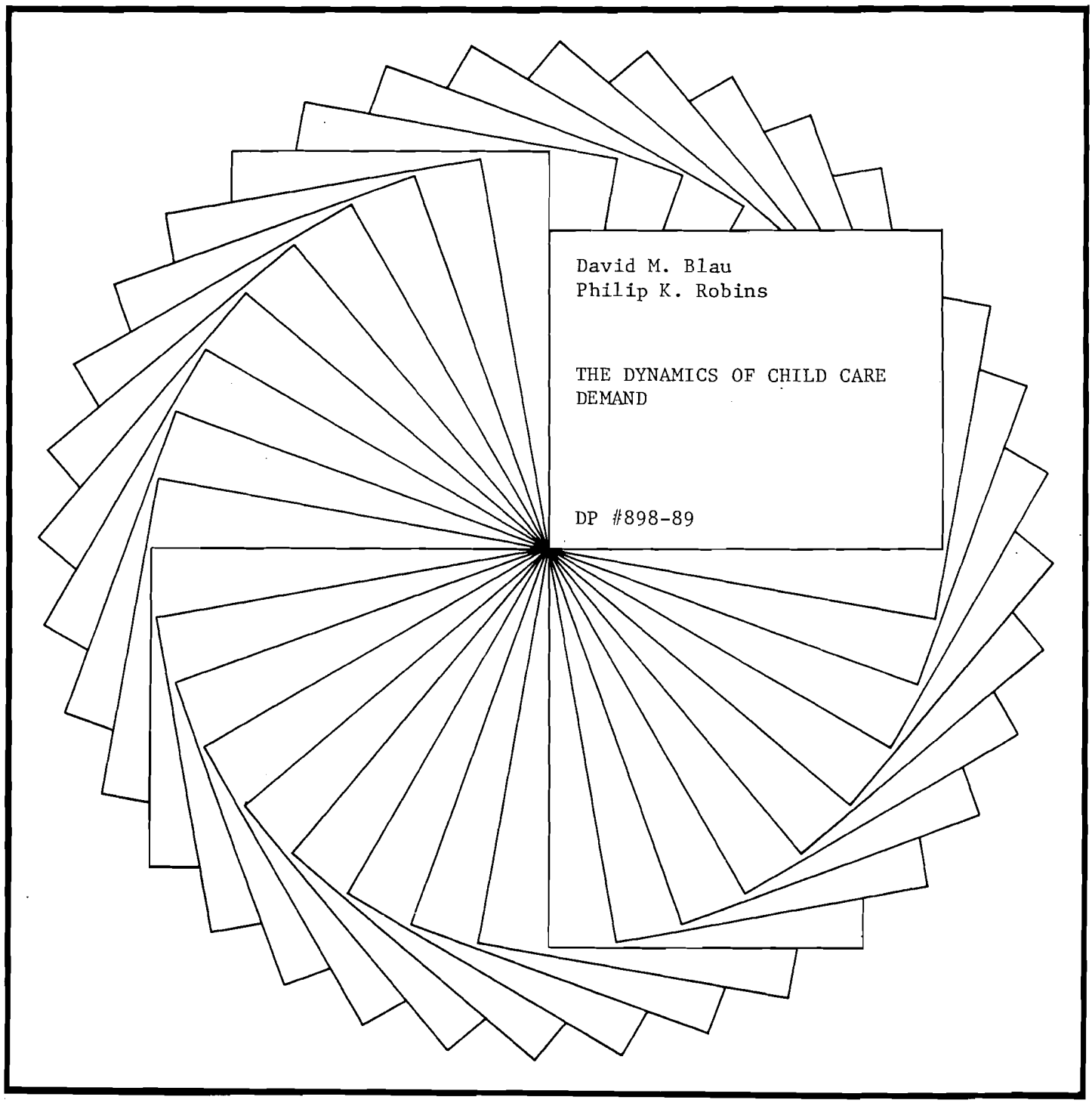

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THE DYNAMICS OF CHILD CARE DEMAND

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THE DYNAMICS OF CHILD CARE DEMAND

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ABSTRACT

This paper analyzes changes in child care arrangements of a sample of children from the Youth Cohort of the National Longitudinal Surveys over the first three years of life. The analysis indicates that turnover in child care arrangements is surprisingly low among this sample and is more common among families of higher socioeconomic status. Child care turnover is positively correlated with mothers' employment turnover, but is not correlated with changes in mothers' marital status or additional births in the families. A Poisson regression model is estimated in which both observed and unobserved variables are allowed to influence child care turnover over time. Because there are multiple observations for the same child and for different children within a family, it is possible to distinguish unobserved mother effects, child effects, and purely transitory effects. The estimates reveal that child care turnover is highly correlated over time, owing mainly to the effects of observed variables and unobserved characteristics of the mother that persist over time.

1. INTRODUCTION

Rapid growth in the labor force participation rate of mothers of young children has resulted in growing public attention to child care issues. Interest in issues of child care availability, quality, cost, and the government's role in subsidizing child care has stimulated research by economists.[1] Most previous studies of child care have used a static framework to analyze these issues.[2] Here, we depart from that approach by focusing on child care within a dynamic framework. We analyze changes in child care arrangements of a sample of children over the first three years of life. We investigate the covariation among changes in child care arrangements and changes in the mother's employment status, marital status, and fertility. The goal of the research is to determine the extent to which changes in child care arrangements are associated with changes in employment status, marital status, child's age, and number of other children in the family as opposed to being random events caused by, for example, a babysitter quitting, a relative moving, or a day care center raising its price. In addition, we examine the effects of observable exogenous variables on changes in child care arrangements.

The empirical analysis uses retrospective data from the 1986 wave of the National Longitudinal Survey of Youth (NLSY) on the number and type of child care arrangements in the first three years of a child's life in conjunction with job, marital status, and fertility histories from the 1979-86 waves of the NLSY. Exact dates of births and of changes in job, employment status, and marital status are available, but the child care data consist only of the number, sequence, and types of

arrangements by year of the child's life. Since child care is the main focus of the analysis, and because it is impossible to construct an event history for the child care data, we use as our dependent variables the number of changes, during a given year of a child's life, in child care arrangements, jobs, employment status, marital status, and number of children in the family.

We begin by examining simple correlations among the various outcomes. These correlations suggest that child care turnover is more closely related to the mother's employment changes than to changes in family structure. We then focus a more extensive analysis on child care and changes in employment status. To sort out the factors affecting these changes, we estimate Poisson regression models, which are appropriate for integer outcome variables. The Poisson models allow (1) a common set of observed explanatory variables to affect changes in both child care and employment status; (2) correlation among the disturbances across equations, capturing common unobserved explanatory variables; and (3) unobserved heterogeneity across children and/or families in each equation. The availability of up to three observations per child and information on multiple children per family allow us to determine the importance of unobserved child and mother effects that persist over time.

The empirical analysis indicates that turnover in child care arrangements is generally quite low, but when it occurs it is more common, other things equal, among families of higher socioeconomic status. Child care turnover is correlated positively with employment turnover, but is not correlated significantly with changes in marital status or parity. Turnover in child care arrangements is highly

correlated over time, owing mainly to the effects of observed variables and unobserved mother effects that persist over time. These results provide the first look at the dynamics of child care use from data in a large, nationally representative survey. The findings indicate considerably greater stability in child care arrangements than is suggested by casual empiricism and by earlier studies on smaller, more select samples (e.g., Floge, 1985). Whether this is due to a lack of suitable arrangements or other factors can only be determined by further research.

Section 2 of the paper describes the data, section 3 specifies the econometric model, section 4 presents the estimation results, and section 5 presents conclusions.

2. DATA AND VARIABLES

The data used in this study are from the Youth Cohort of the National Longitudinal Surveys (NLSY). The NLSY has been conducted annually since 1979. In this study, we use data from the surveys of 1979 through 1986. In the initial, 1979 survey, the sample was selected to represent the entire population of youth born in the United States between 1957 and 1964. Hence, the initial survey contains data on young people aged 14 to 21 as of January 1, 1979. By 1986 these young people were between the ages of 21 and 28. For purposes of analysis, only the sample of women who had at least one child by the time of the 1986 survey is used.

Three samples were included in the original survey. The first is a representative cross-sectional sample of noninstitutionalized civilian

American youth. The second is a supplemental sample designed to oversample civilian black, Hispanic, and economically disadvantaged non-Hispanic, nonblack youth. The third is a representative military sample of 17- to 21-year-olds as of January 1, 1979. In this study, the military sample is excluded.[3]

In the 1986 survey, each female respondent was asked a series of questions about the number and types of child care arrangements used for all her biological children during each of the first three years of each child's life. Table 1 gives the distribution of arrangements used by age of the child and combined across all years.[4] Data from two other nationally representative surveys are provided for comparison, although the other surveys are restricted to the principal arrangement for the youngest child in the family under age 5. The distribution of child care arrangements in the NLSY sample is generally similar to those in the CPS and SIPP samples, despite differences in the survey techniques and the average age of both the children and mothers. The NLSY data show increasing use of formal group care as children become older, with concomitant decreases in home care. Similar findings are reported in Leibowitz, Waite, and Witsberger (1988, p. 209).

Responses to the child care questions in the NLSY have been used to construct a series of measures of turnover in child care arrangements for each of the first three years of each child's life. The three measures considered for this study are the total number of changes in child care arrangements, the number of changes across mode, and the number of changes within mode.[5] The modes we consider are (1) care in the child's home by a relative; (2) care in the child's home by a nonrelative; (3) care outside the child's home by a relative; and (4)

Table 1

Percentage Distribution of Child Care Arrangements by Age of Child

Arrangement[a]	Age of Child					
	NLSY Data[b]				CPS Data[c]	SIPP Data[d]
	0-1	1-2	2-3	0-3	0-5	0-5
In child's home	29.1%	27.1%	25.5%	27.3%	35.5%	31.4%
Relative	22.6	21.2	21.6	21.8	29.1	25.6
Nonrelative	6.5	5.8	3.9	5.5	6.4	5.8
In another home	60.1	54.4	45.6	53.6	46.9	41.4
Relative	33.2	28.7	25.5	29.2	21.2	17.1
Nonrelative	26.9	25.7	20.1	24.4	25.7	24.3
In formal arrangement	10.9	18.6	29.0	19.2	17.3	27.0
Day care center	8.6	14.5	19.4	14.0	10.7	16.1
Nursery school/preschool	2.3	4.1	9.6	5.2	6.5	10.9

[a]Excludes care by the mother.

[b]NLSY data aggregated over all children and all arrangements, 1978-86.

[c]CPS data, collectede June 1982 (U.S. Department of Commerce, 1987), concerning principal arrangement for youngest child under 5.

[d]SIPP data, collected winter 1984-85 (U.S. Department of Commerce, 1987), concerning principal arrangement for youngest child under 5.

care outside the child's home by a nonrelative (which includes day care centers, nursery schools, and preschools). Table 2 presents means of these turnover measures by age of the child for the sample analyzed in this paper.[6] As this table indicates, few families report changing arrangements. Furthermore, there is little difference in turnover by age of the child, although turnover within mode is slightly higher during the first year.

Although little turnover in child care arrangements is reported during the first three years of the child's life, the turnover that does occur may be systematically related to other family events and to exogenous changes in the environment. The most important family events that may be related to changes in child care arrangements are employment turnover and changes in family structure.

To identify employment turnover and changes in family structure during the first three years of each child's life, we use the earlier surveys (1979 through 1985) in addition to the 1986 survey to reconstruct event histories for the family during the appropriate time period. Because the first NLSY was administered in 1979 and collected employment data retrospectively to January 1, 1978, our analysis is limited to child-years (years of the child's life) beginning on or after that date. We consider total changes of the mother in either employment status or jobs (NCES4), changes in employment status only (NCES3), changes in job only (NCES4JOB), and total entries into employment from nonemployment (NCES1EMP). Further distinctions involving changes in labor force status (for example, moving from out of the labor force to unemployment) were also considered but yielded no further insight into the child care-employment relationship.

Table 2

Average Number of Changes in Child Care Arrangements and Mode by Age of Child

Average Number of Changes	Age of Child 0-1	1-2	2-3
In arrangements	.089	.079	.079
Across modes	.042	.041	.041
Within modes	.047	.038	.037
To in-home care	.011	.012	.013
To out-of-home care	.010	.010	.011
To relative care	.011	.017	.017
To nonrelative care	.019	.016	.013
Sample size	3,591	3,257	2,837

Note: Modes are defined as (1) in-home care by relative; (2) in-home care by nonrelative; (3) care outside home by relative; and (4) care outside home by nonrelative. Sample includes all women in NLSY who had at least one child at time of 1986 survey.

Table 3 shows average annual rates of child care and employment turnover by the number of weeks the mother is employed during a given year of a child's life and by overall employment during the year. The data indicate that turnover in child care increases with weeks employed, reaching a maximum of about 20 percent annually among year-round workers. Employment status changes are much more common than child care changes, implying that it is relatively uncommon for a child care arrangement to change simultaneously with an employment status change. Among part-year workers, the rate of employment status changes averages two per year, and job changes are also quite common among women working at least half the year.

One of the main goals of this study is to analyze the relationship between child care turnover and employment turnover. A preliminary indication is provided in the upper panel of Table 4, which presents simple correlations among the various measures of child care and employment turnover. Each measure of child care turnover is positively correlated with all the employment turnover variables, and all the correlations are statistically significant at the 5 percent level. The correlations are less than or equal to .1, but they indicate that at least part of the observed changes in child care arrangements is associated with changes in employment status. Inter-mode child care changes (NCCCA4) are more than twice as highly correlated with employment status changes as are intra-mode changes, suggesting that intra-mode changes are more likely to be caused by random, transitory events.

The lower panel of Table 4 presents correlations between child care turnover and births and marital status turnover. These correlations are

Table 3

Average Number of Changes in Child Care Arrangements and Employment Status by Weeks Employed (standard deviation in parenthesis)

Average Number of Changes in:	Weeks Employed in a Child-Year				
	0	1-25	26-49	50-52	0-52
Child care arrangements (NCCCA1)	.015 (.144)	.070 (.311)	.169 (.509)	.205 (.611)	.083 (.368)
Across mode (NCCCA4)	.007 (.095)	.034 (.194)	.093 (.314)	.096 (.321)	.042 (.212)
Within mode (NCCCA5)	.008 (.010)	.036 (.230)	.076 (.368)	.108 (.504)	.041 (.278)
Employment status					
Into employment (NCES1EMP)	0 (0)	1.061 (.629)	1.155 (.691)	.082 (.281)	.483 (.697)
Job or whether employed (NCES4)	0 (0)	2.063 (1.209)	2.506 (1.579)	.606 (1.012)	1.046 (1.459)
Whether employed (NCES3)	0 (0)	1.939 (1.113)	2.038 (1.275)	.163 (.518)	.869 (1.254)
Job (NCES4JOB)	0 (0)	.124 (.372)	.468 (.756)	.443 (.840)	.177 (.524)
Sample size	4,310	2,228	1,911	1,236	9,685

Table 4

Correlations among Child Care Changes and Other Variables

Variables	Correlations with Child Care Changes: Total (NCCCA1)	Across Mode (NCCCA4)	Within Mode (NCCCA5)
Employment Status and Job Changes			
Into employment (NCES1EMP)	.084*	.088*	.043*
Job or whether employed (NCES4)	.089*	.103*	.038*
Whether employed (NCES3)	.067*	.080*	.028*
Job (NCES4JOB)	.086*	.096*	.040*
Births and Marital Status Changes			
Number of births	-.018	-.021*	-.007
Number of times widowed, separated, or divorced	.029*	.011	.030*
Number of times married	-.018	-.003	-.021*

*Correlation coefficient is significantly different from zero at the 5 percent level.

generally much smaller than the child care-employment turnover correlations, and are often not statistically significant. Therefore, in the remainder of the paper we focus on a more extensive econometric analysis of the relationship between employment and child care.

3. ECONOMETRIC MODEL

Our econometric specification is motivated by a dynamic, discrete choice model of the mother's labor supply and child care decisions.[7] At a given time a woman occupies a particular state. A state in this model is characterized by the employment status of the mother and the child care arrangement for the children younger than some specified age. A mother can be not employed, employed in job 1, employed in job 2, etc., where both job changes and employment status changes are considered a change of state. Child care arrangements are defined by both the mode and the specific provider. A change in mode or provider means a change of state. The utility flow from occupying a particular state at a given moment is a function of the mother's leisure hours in the state, the quality of the child care arrangement, and a composite purchased good. Quality is a function of the attributes of the child care arrangement, such as the ratio of caregivers to children and the training of the caregivers, and a set of household characteristics such as the age distribution of children and the mother's education. The family faces a series of period-by-period budget constraints that specify equality between income and expenditures, where income consists of the mother's earnings (wage rate time hours worked) plus other family income, and expenditures include the cost of child care. Child care costs are

modeled as a function of the quality of the arrangement and the price per unit of quality.[8]

At random intervals, the family is subject to shocks that alter the values of one or more exogenous variables, such as the mother's wage rate, the price of child care quality, and other family income. In addition, if the mother is employed she faces a layoff risk and a risk that the current child care arrangement may become unavailable or change in quality. For example, a babysitter might quit or a day care center might raise its price. Thus, a family may change states because of some change that is foreseen, such as a child growing older, a birth, or because of the occurrence of one of the random events that either yields a new value of an exogenous variable that causes a reevaluation of utility in the different states or directly causes a change of state, e.g., a layoff.

The family's goal is to choose a sequence of states, and values of choice variables for given states, to maximize the expected present discounted value of lifetime utility, subject to the budget, time, and quality production constraints, and the arrival probabilities and distribution functions of the random variables.

The model described above provides a framework for analyzing and interpreting data on labor market and child care histories. The type of econometric analysis that is appropriate depends on the type of data available. If a continuous record of the state occupied in each period were available, then an event-history analysis of the duration of spells in particular states of interest would be appropriate. However, as described above, our data contain continuous records on employment status, but not on child care. The data on child care arrangements

record the number and sequence of different arrangements used during each of the first three years of a child's life, but not the dates of changes in arrangements. Hence, it is not possible to construct a continuous record of the state occupied in each period when a state is defined by both employment status and child care arrangement.

Instead, as indicated above, we integrate the child care data with employment data by defining each dependent variable in terms of the number of changes occurring during a given year of a child's life. Thus, we analyze the annual rates of change of employment status and child care arrangements. Based on the theoretical model sketched above, we allow for a common set of observed and unobserved determinants of these variables in a reduced form framework. We adopt a reduced form framework because of the essentially exploratory nature of the analysis.

Because the dependent variables in our analysis are counts of events, we employ Poisson models for them, specified as

$$\Pr(y_{kijt} = n) = e^{-\gamma_{kijt}} \gamma_{kijt}^{n} / n! \ , \ n = 0,1,2, \ . \ . \ . \qquad (1)$$

where y_{1ijt} = the number of changes in child care arrangements of the i^{th} child of the j^{th} mother in year t, y_{2ijt} is the corresponding number of employment changes, and the Poisson parameter, γ_{kijt}, is given by

$$\gamma_{kijt} = e^{Z_{ijt} \beta_k}, \qquad (2)$$

where Z is a vector of observed explanatory variables and β_k is a parameter vector. The Poisson model is a convenient statistical model for count variables and has been used in many contexts in applied economics. It is straightforward to form and maximize the logarithm of

the likelihood function for a sample of observations, using equations (1) and (2). Furthermore, the Poisson model has been shown to be readily adaptable to panel data contexts.[9]

Our estimation strategy is to first estimate Poisson models that ignore the panel nature of the data, i.e., the fact that we have multiple observations on children and in some cases multiple children per mother. We then compute residuals, using the fact that in the Poisson model $Ey_{kijt} = \gamma_{kijt}$, and decompose the residual variance into a mother component, a child component, and a transitory component. Defining the residual as $u_{kijt} = y_{kijt} - \hat{\gamma}_{kijt}$, we specify

$$u_{kijt} = \mu_{kij} + \delta_{kj} + \varepsilon_{kijt}, \quad k = 1,2 \tag{3}$$

where μ_{kij} is a mean-zero, child-specific effect for the k^{th} outcome for the i^{th} child of woman j, δ_{kj} is a mean-zero, mother-specific effect that is the same for all children of a given mother, and ε_{kijt} is an i.i.d. mean-zero disturbance with $E(Z\varepsilon) = 0$ in all equations. This specification exploits the panel nature of our data by incorporating an additive child effect, and it exploits the potential availability of data on more than one child per mother by including an additive mother effect. The mother effects, δ_{kj}, capture differences across mothers in rates of change that are not explained by the variables in Z. The child effects, μ_{kij}, capture differences across the children of mother j in rates of change that are not explained by Z or picked up by the common-across-children-of-mother-j effects δ_{kj}. In practice, there may be little intra-child variation that is not already captured by the mother effects.

We analyze the variance components of equation (3) by calculating

$$\sigma^2_{uk} = \sigma^2_{\mu k} + \sigma^2_{\delta k} + \sigma^2_{\varepsilon k} \tag{4}$$

under the assumption that the variance components are orthogonal to each other. Let

$$R_{kij} = \frac{1}{T_{ij}} \sum_{t=1}^{T_{ij}} u_{kijt}, \tag{5}$$

where T_{ij} = the number of years for which the i^{th} child of woman j is observed; and let

$$R_{kj} = \frac{1}{N_j} \sum_{i=1}^{N_j} R_{kij} = \frac{1}{N_j T_{ij}} \sum_{i=1}^{N_j} \sum_{t=1}^{T_{ij}} U_{kijt}, \tag{6}$$

where N_j = the number of children of woman j. Then, as T_{ij} and N_j grow large, $ER^2_{kj} = \sigma^2_{\delta k}$, and $ER^2_{kij} = \sigma^2_{\delta k} + \sigma^2_{\mu k}$, allowing calculation of the three variance components in (4). Based on the results of this exercise, we gain information that can be used in respecifying the econometric model to exploit the panel nature of the data, i.e., to include an error term incorporating a mother effect, a child effect, a transitory effect, or some combination.

According to the theoretical model, the variables that belong in Z are determinants of tastes, exogenous factors affecting quality of child care, nonmother income, wage rate, price of child care, and determinants of the distribution functions and rates of arrival of new values of the random variables. The explanatory variables used in the empirical model are described in Table 5, along with their means and standard deviations. In addition to personal characteristics of the mother and her family, the model includes several county-level variables obtained

Table 5

Means and Standard Deviations of Explanatory Variables

Variable	Definition	Mean	Standard Deviation
AGEC	Child's age in years plus one	1.9	.81
AGEM	Age of child's mother	21.3	2.5
EDUCM	Mother's years of schooling	11.3	2.0
BLACK	Dummy = 1 if mother is black	.32	.47
RACEOTH	Dummy = 1 f mother's race is other than black or white	.06	.24
NK2TO5	Number children aged 2-5 in household	.50	.71
NK6TO11	Number children aged 6-11 in household	.21	.55
NK12TO18	Number children aged 12-18 in household	.31	.78
NUMOTHAD	Number adults other than mother and her spouse	.72	1.2
FORBORNP	Dummy = 1 if either of mother's parents is foreign born	.11	.32
PAREDUCF	Years of schooling of mother's father	9.5	3.4
NONWAGEI	Annual nonwage, nonwork-conditioned income/$10,000	$.0235	$.132
SMSA	Dummy = 1 if resides in SMSA	.69	.46
PREDCC	Predicted hourly cost of child care	$.50	$.16
PREDWAGE	Predicted hourly wage of mother	$2.34	$.58
TIME	Years since January 1, 1960, as of beginning of child-year	22.2	1.9
TIMESQ	Time squared	498.4	83.6
HEALTH	Dummy = 1 if mother's health limits her work	.11	.31
CRIME	County annual crime rate/10 population	.55	.32
MEDINC	County annual median family income/$10,000	$1.35	$.58
POPDEN	County population density/sq mile/10,000	.19	.59
PERBLACK	Percentage county population that is black	14.5	14.7

Table 5, continued

Variable	Definition	Mean	Standard Deviation
PERCOMHS	Percentage of county population aged 25+ years completing high school	55.9	13.3
PERFEMHD	Percentage of county households with no husband present	12.9	4.6
PERMANUF	Percentage of county employment in manufacturing	23.6	11.0
PERTRADE	Percentage of county employment in wholesale and retail trade	20.2	3.1
POVERTY	Percentage of county families in poverty	12.4	7.3
UNEMRATE	County unemployment rate	7.2	3.9
PERURBAN	Percentage urban in county	70.9	28.6

Note: The county-level variables are from the Geocode file available from the Center for Human Resource Research. The data for these variables are mainly from various editions of The County and City Data Book. Means were assigned for cases with missing values for some of the variables. Information on household structure (numbers of children and other adults) is as of the survey date closest to the beginning of the child-year. In some cases, respondents were not interviewed in every year. If the closest survey date is more than one year before the beginning of the child-year, then the observation was dropped. Income information in the NLSY pertains to calendar years. NONWAGEI is a weighted average of nonwage income in the calendar years that overlap with the child-year, where the weights are the fraction of the child-year occurring in each calendar year. All dollar variables are deflated to a 1979 basis.

from the NLSY Geocode file (see Center for Human Resource Research, 1988). Most of the variables we include can be considered exogenous to the dependent variables we analyze.

We use predicted values of the hourly wage rate and the hourly cost of child care for each woman, since the actual values of these variables are not observed for all women, and the actual values that are observed are likely to be endogenous.[10] The predicted values of the wage rate are from a selectivity-corrected log wage regression on the sample reporting a wage, estimated jointly by maximum likelihood with the selection equation for observing wages. The entire female NLSY sample for all years is used in the estimation. Child care costs are predicted from a selectivity-corrected, log-cost-per-hour equation using the sample who reported positive child care costs in the 1982, 1985, and 1986 surveys. These were the only years in which child care cost questions were asked. The equation is corrected for selectivity on both employment status and, conditional on employment, whether positive costs are reported. This is done by estimating a bivariate probit model by maximum likelihood on employment status and whether positive costs are reported and then constructing a selectivity correction term for inclusion in the log cost equation.[11] The results for the wage and cost models are reported in an appendix available from the authors.

4. EMPIRICAL RESULTS

Table 6 presents maximum likelihood Poisson estimates of equations for the broadest definitions of child care turnover (NCCCA1) and employment turnover (NCES4). As discussed above in section 3, the

Table 6

Poisson Regression Coefficients (and standard errors)
for Child Care and Employment Changes

	Child Care Turnover (NCCCA1)		Employment Turnover (NCES4)	
Intercept	6.49	(5.57)	1.421	(1.528)
AGEC	-0.127	(.046)*	0.040	(0.013)*
AGEM	0.152	(.032)*	-0.020	(0.009)*
EDUCM	0.234	(.039)*	0.125	(0.011)*
HEALTH	-0.409	(.142)*	-0.189	(0.038)*
BLACK	-0.938	(.137)*	-0.363	(0.039)*
RACEOTH	-0.125	(.175)	-0.147	(0.049)*
NK2TO5	-0.351	(.066)*	-0.051	(0.016)*
NK6TO11	-0.136	(.094)	-0.018	(0.021)
NK12TO18	-0.116	(.079)	-0.052	(0.017)*
NUMOTHAD	0.021	(.044)	0.061	(0.010)*
FORBORNP	-0.586	(.158)	*0.072	(0.034)*
PAREDUCF	0.064	(.012)	*0.006	(0.003)*
PREDCC	-3.702	(.550)*	-0.452	(0.176)*
PREDWAGE	-0.160	(.161)	-0.168	(0.049)*
NONWAGEI	0.043	(.278)	0.295	(0.068)*
TIME	-1.199	(.502)*	-.086	(.139)
TIMESQ	.028	(.011)*	.0015	(.0033)
SMSA	0.0040	(.123)	-0.014	(0.034)
CRIME	0.177	(.177)	0.081	(0.052)
MEDINC	1.266	(.282)*	0.451	(0.081)*
POPDEN	-0.100	(.099)	-0.182	(0.029)*
PERBLACK	0.0034	(.0050)	0.0026	(0.0012)*
PERCOMHS	-0.0242	(.0070)*	-0.0050	(0.0019)*
PERFEMHD	0.0241	(.0191)	0.0004	(0.005)
PERMANUF	-0.0139	(.0054)*	-0.0105	(0.0014)*
PERTRADE	0.0326	(.0192)	-0.0039	(0.0051)
POVERTY	-0.0521	(.0137)*	-0.0169	(0.0032)*
UNEMRATE	0.0103	(.0130)	-0.0233	(0.0038)*
PERURBAN	-0.0002	(.0031)	-0.0006	(0.0008)

*Coefficient estimate is significantly different from zero at the 5 percent level.

estimation method does not account for the panel nature of the data. Under the assumption that the error components in equation 3 are uncorrelated with the right-hand-side variables (i.e., $E(Z\mu) = E(Z\delta) = E(Z\varepsilon) = 0$), the coefficient estimates are consistent. Most of the parameter estimates in Table 6 are significantly different from zero at conventional levels, which is not surprising given the large sample size of 9,685.

Several interesting patterns emerge from the results. First, women of higher "socioeconomic status" are more likely to experience turnover in child care arrangements than other women: mother's education, grandfather's education, and median county income all have positive effects on NCCCA1. Blacks, women with a foreign-born parent, and families living in counties with high poverty rates have lower turnover. This suggests, loosely speaking, that turnover in child care arrangements is a normal good. One interpretation consistent with this finding is that the most suitable arrangement for a child depends on the child's age, and wealthier families can afford to change arrangements as a child ages, while poorer families are stuck with whatever arrangements they can find.[12] This interpretation runs counter to the view that child care turnover is caused mainly by instability of family life or of employment associated with poverty.

Second, a similar pattern appears to exist for employment and job turnover. Women of higher socioeconomic status tend to experience greater employment and job turnover. A plausible interpretation of this finding is that wealthier women can afford to leave employment more easily than poorer women and have access to better information about job

vacancies. Poorer women, according to this interpretation, are more likely to be stuck in dead-end jobs. As in the case of child care, turnover in employment and jobs appears to be a "normal good." This is consistent with the positive correlation between child care and employment turnover noted above.

Third, the demographic structure of the household has a substantial impact on the rate of turnover in child care arrangements. Turnover declines, other things equal, as children become older. The presence of other children, particularly other pre-school-aged children, tends to reduce child care turnover, while the presence of other adults does not have a statistically significant impact. One interpretation of this result is that women with more children are less likely to work and therefore experience less turnover in child care.[13] This is consistent with the negative effects of the numbers-of-children variables on employment turnover in column 2.

Fourth, older mothers experience higher turnover in child care, but lower turnover in employment. Note that the mothers in the sample range from age 13 to 28. It is interesting to note that the age of the mother is one of only three statistically significant variables having opposite signs in the child care and employment turnover equations (the others being child's age and foreign-born parents). Most variables affect child care and employment turnover in similar directions. It is not obvious why older mothers experience more turnover in child care, but one possibility is that teenage motherhood is similar to low socioeconomic status in limiting a woman's ability to change child care arrangements when she wishes.

Fifth, turnover in employment and child care is lower for women with higher wages and higher child care costs. Lower turnover among workers with relatively high wages is consistent with other studies of employment turnover (e.g., Topel, 1986). The negative effect of child care costs on child care turnover suggests that stability may be part of what is purchased by high child care costs. Since instability in child care is associated with instability in employment, higher child care costs may also facilitate more stable employment.

Sixth, there is a nonlinear trend in child care turnover, all else equal, with turnover estimated to have declined until 1981 and increased through 1986.[14]

The child care turnover variable in Table 6 includes inter-mode changes (e.g., changing from a babysitter to a day care center), as well as intra-mode changes (e.g., replacing one babysitter with another in the child's home). It is possible that the factors influencing these two types of changes may be different. Within-mode changes are probably more likely to be caused by "random" events such as a babysitter quitting, a grandmother becoming ill, or a day care center raising its price. Across-mode changes were shown above to be more likely associated with changing employment status than were intra-mode changes. To explore these issues, the model was reestimated separately for inter-mode (NCCCA4) and intra-mode (NCCCA5) changes in child care arrangements.

The results are presented in Table 7. They indicate that the majority of the explanatory variables have effects of the same sign in both equations. However, there are some substantial quantitative differences in the effects of some variables on turnover across and

Table 7

Poisson Regression Coefficients for Changes across Modes and within Modes of Child Care

	Changes across Modes (NCCCA4)		Changes within Mode (NCCCA5)	
Intercept	8.842	(7.825)	1.523	(8.034)
AGEC	-0.032	(0.065)*	-0.218	(.066)*
AGEM	0.203	(0.050)*	0.136	(.041)*
EDUCM	0.283	(0.057)*	0.209	(.054)*
HEALTH	-0.281	(0.191)	-0.552	(.212)*
BLACK	-0.728	(0.202)*	-1.190	(.190)*
RACEOTH	0.372	(0.230)	-0.690	(.282)*
NK2TO5	-0.408	(0.095)*	-0.296	(.092)*
NK6TO11	-0.267	(0.138)*	-0.010	(.129)
NK12TO18	0.032	(0.099)	-0.316	(.129)*
NUMOTHAD	0.012	(0.060)*	0.026	(.064)
FORBORNP	-0.579	(0.219)*	-0.592	(.228)*
PAREDUCF	0.030	(0.017)	0.102	(.017)*
PREDCC	-1.384	(0.819)	-5.887	(.790)*
PREDWAGE	-0.706	(0.285)*	0.127	(.185)
NONWAGEI	0.229	(0.358)	-0.148	(.439)
TIME	-1.629	(0.702)*	-0.725	(.725)
TIMESQ	0.039	(0.016)*	0.017	(.017)
SMSA	-0.144	(0.166)	0.288	(.185)
CRIME	0.137	(0.352)	0.1601	(.229)
MEDINC	1.699	(0.404)	1.888	(.400)*
POPDEN	-0.329	(0.188)	0.042	(.122)
PERBLACK	-0.0079	(0.0072)	0.012	(.0068)
PERCOMHS	-0.0189	(0.0100)	-0.0300	(.0100)*
PERFEMHD	0.0548	(0.0280)*	-0.0014	(.0268)
PERMANUF	-0.0060	(0.0077)	-0.0201	(.0078)*
PERTRADE	0.0398	(0.027)	0.0233	(.0277)
POVERTY	-0.0450	(0.019)*	-0.0530	(.0201)*
UNEMRATE	-0.0303	(0.019)	0.0424	(.0184)*
PERURBAN	-0.0012	(0.0043)	0.0028	(.0045)

*Coefficient estimate is significantly different from zero at the 5 percent level.

within modes. The negative effect of the age of the child from Table 6 is due solely to intra-mode changes and may therefore indicate a trial-and-error period during the early years. The presence of children aged 2 to 5 and 6 to 11 has a larger negative impact on inter-mode than intra-mode changes, but the opposite is true for the presence of family members aged 12 to 18. This is consistent with lower labor force participation by women with young children and therefore less employment turnover and employment-related child care turnover. The smaller effects on intra-mode turnover are consistent with the interpretation that such turnover is random rather than employment related. Another difference is that the time trend appears to exist solely for inter-mode turnover, which is also consistent with the notion that intra-mode turnover occurs at random intervals with a relatively unchanging distribution over time.

The discussion to this point has focused on the observable determinants of child care and employment changes. We now turn to the analysis of the residuals from each equation, representing the unobserved determinants of changes in the dependent variables. Analysis of the residuals reveals the extent to which common unobserved factors influence the different dependent variables and whether these factors are transitory or permanent.

Table 8 presents estimates of the residual variance from each equation and the share of the variance attributed to permanent unobserved characteristics of the mother, permanent unobserved characteristics of the child, and purely random effects. Before discussing the variance components analysis, note that the Poisson model is based on a one-parameter distribution: the mean and residual

Table 8

Residual Variance Components

	Residual Variance	Share of Residual Variance Due to		
		Mother Effect (δ)	Child Effect (μ)	Transitory Effect (ε)
NCCCA1	.132	.69	.06	.25
NCCCA4	.046	.70	.02	.28
NCCCA5	.076	.61	.07	.32
NCES1EMP	.469	.50	.08	.42
NCES4	2.045	.58	.06	.36
NCES3	1.524	.52	.08	.40
NCES4JOB	.268	.63	.02	.35

variance of a Poisson random variable are the same. Hence, a comparison of the actual mean and variance indicates to some extent whether the Poisson model is an adequate representation of the data. For all the dependent variables, the residual variance exceeds the mean, indicating "overdispersion" (Cameron and Trivedi, 1986). However, the variance is never more than twice the mean and in some cases it is very close, so the Poisson model appears reasonable for these data. In fact, using the "score" test discussed in Cameron and Trivedi (1986:41-42), we cannot reject the null hypothesis that the mean and variance are equal for any of the dependent variables.

The variance components analysis shows that persistent mother effects exist for all variables, accounting for 61 to 70 percent of the residual variance of the child care turnover variables and 50 to 63 percent of the residual variance of the employment turnover variables. Not surprisingly, some women persistently experience higher than average turnover and others lower than average turnover. Child effects are estimated to be small, indicating that intertemporal residual correlation in turnover for children is due mainly to permanent unobserved characteristics of their mothers.[15] Transitory factors account for 25 to 40 percent of residual variance. Note that in the case of child care turnover within model (NCCCA5), the relatively low share of the transitory effect is consistent with the conjecture discussed above that such turnover is likely to be the result of random events. Some women are simply more prone to experience such events, for whatever reasons.

Given the evidence in Table 8, we respecified the Poisson model for child care turnover to incorporate a fixed mother effect, following

Hausman, Hall, and Briliches (1984), and estimated the model by maximum likelihood.[16] The results for NCCCAl are given in Table 9 (the results for the other variables are omitted for the sake of brevity). The qualitative conclusions drawn from the ordinary Poisson results in Table 6 remain essentially unchanged when a fixed mother effect is incorporated. There are no cases in which a coefficient estimate is of the opposite sign and statistically significant in both models. In many cases, however, the coefficient estimates across models differ substantially in magnitude, indicating the importance of accounting for individual effects when making specific quantitative inferences.

5. CONCLUSIONS

This paper represents a first effort at examining the dynamics of child care demand. A theoretical model of child care turnover was briefly sketched to motivate the empirical analysis, but the empirical results are based on a reduced-form model and serve mainly to identify patterns that may be important to incorporate in future structural models. The patterns emerging from our results include: (1) turnover in child care arrangements (as defined and measured in this study) is relatively low, affecting less than 10 percent of this sample of mothers annually; (2) child care and employment turnover appear to be "normal" goods, in the sense that such turnover is more common among families of higher socioeconomic status; (3) child care and employment turnover are positively correlated, especially for changes in mode of child care; (4) child care turnover is not highly correlated with marital status changes or the birth of other children; and (5) there is considerable

Table 9

Poisson Regression Coefficients for NCCCA1
Incorporating a Fixed Mother Effect

AGEC	-.063	(.026)*	SMSA	.533	(.150)
AGEM	1.200	(.040)*	CRIME	.214	(.130)
EDUCM	.039	(.031)	MEDINC	1.050	(.230)*
HEALTH	.166	(.120)	POPDEN	-.558	(.140)*
NK2TO5	-.166	(.043)*	PERBLACK	-.021	(.006)*
NK6TO11	1.814	(.049)*	PERCOMHS	-.049	(.007)*
NK12TO18	-.382	(.048)*	PERFEMHD	.041	(.007)*
NUMOTHAD	-.082	(.030)*	PERMANUF	-.051	(.007)*
PREDCC	-2.753	(.45)*	PERTRADE	-.065	(.019)*
PREDWAGE	.230	(.140)	POVERTY	-.072	(.013)*
NONWAGEI	-.876	(.160)	UNEMRATE	.042	(.010)*
TIME	-5.858	(.017)*	PERURBAN	-.0023	(.0032)
TIMESQ	.185	(.007)*			

Note: The coefficients of variables that are constant over time cannot be estimated with a fixed-effect model.

persistence in the unobservable variables determining child care turnover over time, owing mainly to permanent unobserved characteristics of the mother, rather than to permanent unobserved characteristics of the child.

In future work it would be useful to estimate and test specific structural models of child care turnover. The results presented in this paper can serve as a guide to specification of such structural models. For example, the lack of correlation among marital status changes and births and child care turnover suggests that the main focus of structural models should be on the child care-employment relationship. The residual analysis also suggests that mother effects may capture the main source of unobserved heterogeneity.

It would be premature to try to draw general conclusions from these results because of the somewhat special nature of the sample (relatively young mothers) and because possible turnover involving movement to or from the mother as caregiver was missed in the survey. If the results of this study are confirmed in other studies using different data sets, then they have some important implications. Turnover among child care workers is quite high (see Blau, 1989b for estimates), and the relatively low rate of turnover among child care users suggests either that there is considerable continuity in day care <u>firms</u> or that much turnover among users actually involves movement to or from mother care. In the former case, child care workers may come and go, but a child remains in the same day care center and therefore does not experience turnover as we have measured it. In the latter case, the implication is that turnover in child care arrangements is associated with (and perhaps

causes) considerable turnover in employment. Distinguishing these two scenarios should be an important item on the research agenda.

Notes

[1]Recent papers on economic aspects of child care include Blau (1989a, 1989b), Blau and Robins (1988, 1989), Connelly (1987), Leibowitz, Waite, and Witsberger (1988), and Robins (1989). An important earlier paper is Heckman (1974).

[2]An exception is Floge (1985), who analyzed longitudinal data on child care use. However, her sample was very small and as a result her analysis is inconclusive about dynamic issues.

[3]For a general description of the NLSY, see Center for Human Resource Research (1988). The subsample of women with children as of 1986 is not likely to be representative of all women who will eventually have children, since the oldest woman in the sample as of 1986 is 28 years old. Thus, the sample contains a disproportionate number of children of young mothers. Compared to the women in the NLSY who had not had a child by the 1986 survey, our sample averages almost two years less education, is 32 percent black compared to 20 percent for the nonmothers, and averages one year older. Consequently, the results presented here should be generalized only with caution.

[4]The NLSY sample in Table 1 consists of all children who use any of 14 arrangements reported in the survey in a given year. We have aggregated the arrangements into the six groups shown in the table to make the data comparable to the other surveys. About 37 percent of the sample members report using at least one of the 14 child care arrangements during the specified child year. The percentage using child care increases with the age of the child; it is 31 percent in the

first year, 39 percent in the second year, and 43 percent in the third year.

[5]It is important to note that care by the mother is not identified as a specific arrangement in the survey. Hence, the frequency measures we have constructed will be understated to the extent that care by the mother is used at different times during the year. For example, suppose the mother cares for her own child for six months, then tries a day care center for two months, and takes the child out of the day care center and cares for her child the remaining four months of the year. The true number of changes in child care arrangements (which includes the mother) is two, while the measured number of changes (which excludes the mother) is zero. Because the dates of child care use are not reported in the survey, there is no straightforward way to estimate the extent to which the mother's care is used.

[6]The full NLSY sample contains 11,391 observations (where the unit of observation is a child-year). Because of missing data on the outcome variables (see below) plus other inconsistencies in the data, 1,706 observations are lost, leaving a final analysis sample of 9,685.

[7]The model is sketched here very briefly. It is described more thoroughly in a longer version of the paper, available from the authors.

[8]This formulation is based on the assumption that quality can be measured in one dimension, akin to I.Q. An alternative approach is to recognize that there are multiple attributes that contribute to quality and to price them out hedonically. This requires considerably more detailed data than are available in the NLSY, so we do not pursue such an approach here.

[9]See Gourieroux, Monfort, and Trognon (1984) and Hausman, Hall, and Griliches (1984) for discussions of panel data Poisson models.

[10]For example, observed child care costs are likely to be positively correlated with quality of care, which is an endogenous variable in our model.

[11]The appropriate selectivity correction term for a bivariate selection model is given in Maddala (1983:368). A similar procedure was used by Connelly (1989). The reason for using a probit model to correct for whether positive costs are reported (instead of using a tobit for the unconditional cost equation) is that different factors may affect whether paid care is used and the amount paid, conditional on using paid care.

[12]See Leibowitz, Waite, and Witsberger (1988) and references therein for a discussion of the findings of the child development literature on the "optimal" child care arrangement by age of the child.

[13]The correlation between weeks worked in a child-year and each of the numbers-of-children variables is negative and significantly different from zero at the .1 percent level.

[14]The quadratic time effect is zero when TIME = 21.4, where TIME is measured in years since January 1, 1960.

[15]The one-year-apart intertemporal residual correlations are .40 to .45 for NCCCA1, .28 to .32 for NCCCA4, .36 to .47 for NCCCA5, and .16 to .31 for the employment turnover variables.

[16]The log likelihood function is given by equation 2.5 in Hausman, Hall, and Griliches (1984).

References

Blau, David M. 1989a. "The Labor Market Effects of Child Care Subsidies." Unpublished manuscript. Chapel Hill: University of North Carolina.

_____. 1989b. "The Child Care Labor Market." Unpublished Manuscript. Chapel Hill: University of North Carolina.

Blau, David M. and Philip K. Robins. 1988. "Child Care Costs and Family Labor Supply." Review of Economics and Statistics 70(3):374-381.

_____. 1989. "Fertility, Employment, and Child Care Costs." Demography 26(2):287-299.

Cameron, A. Colin and Pravin K. Trivedi. 1986. "Econometric Models Based on Count Data: Comparisons and Applications of Some Estimators and Tests." Journal of Applied Econometrics 1(1):29-53.

Center for Human Resource Research. 1988. NLS Handbook: 1988. Columbus, OH: The Ohio State University.

Connelly, Rachel. 1987. "The Market for Child Care." Paper presented at Population Association of America Meetings, Chicago.

_____. 1989. "The Effect of Child Care Costs on Married Women's Labor Force Participation." Paper presented at the Population Association of America meetings, Baltimore.

Floge, Liliane. 1985. "The Dynamics of Child-Care Use and Some Implications for Women's Employment." Journal of Marriage and the Family February:143-154.

Gourieroux, C., A. Montfort, and A. Trognon. 1984. "Pseudo Maximum Likelihood Methods: Applications to Poisson Models." Econometrica 52(3):701-720.

Hausman, Jerry, Bronwyn H. Hall, and Zvi Griliches. 1984. "Econometric Models for Count Data with an Application to the Patents-R&D Relationship." Econometrica 52(4):909-938.

Heckman, James J. 1974. "Effects of Child Care Programs on Women's Work Effort." Journal of Political Economy 82(Supplement):136-163.

Leibowitz, Arleen, Linda J. Waite, and Christina Witsberger. 1988. "Child Care for Preschoolers: Differences by Child's Age." Demography 25(2):205-220.

Maddala, G. S. 1983. Limited-Dependent and Qualitative Variables in Econometrics. New York: Cambridge University Press.

Robins, Philip K. 1989. "Federal Financing of Child Care: Alternative Approaches and Economic Implications." Institute for Research on Poverty, University of Wisconsin-Madison, Discussion Paper no. 890-89.

Topel, Robert. 1986. "Job Mobility, Search and Earnings Growth." Research in Labor Economics 8(pt. A):199-233.

U.S. Department of Commerce, Bureau of the Census. 1987. "Who's Minding the Kids?" Current Population Report, Series P-70, no. 9.

Table A-1

Joint Maximum Likelihood Estimates of Probit for Employment and Log Wage Equation

	Employed		Log Wage	
Intercept	-3.23	(.21)*	-.62	(.09)*
BLACK	-.41	(.03)*	-.14	(.01)*
RACEOTH	-.11	(.05)*	.01	(.03)
NUMOTHAD	.018	(.008)*		
FORBORNP	.04	(.04)		
EDUCM	.30	(.08)*	.113	(.004)*
EXPERIENCE	.093	(.011)*	.093	(.005)*
$EXPERIENCE^2$	-.017	(.010)	-.035	(.004)*
HUSEARN	-.075	(.016)*		
NONWAGEI	-.189	(.072)*		
SMSA	-.05	(.03)	-.001	(.017)
HEALTH	-.39	(.05)		
PAREDUCM	.010	(.004)*	.0054	(.0019)*
CENSUS REGION				
NE	-.04	(.06)	-.003	(.03)
MA	-.15	(.05)*	-.029	(.022)
SA	-.01	(.05)	-.082	(.022)*
ESC	-.07	(.06)	-.099	(.027)*
WSC	.04	(.05)	-.016	(.023)
ENC	-.18	(.04)*	-.078	(.021)*
WNC	.003	(.06)	-.112	(.027)*
MOUNT	.06	(.06)	-.106	(.028)*
PERBLACK	.0017	(.0015)		
PERCOMCO	.0083	(.0043)	.0035	(.0017)*
PERCOMHS	-.0036	(.0026)	-.0002	(.0010)
PERFEMHD	-.0094	(.0051)		
PERMANUF	.0028	(.0016)	.0010	(.0007)
PERTRADE	.0018	(.0052)	-.0064	(.0025)*

Table A-1, continued

	Employed		Log Wage	
POVERTY	-.0152	(.0032)*		
UMEMRATE	-.030	(.005)*	-.0077	(.0021)*
MEDINC	.0095	(.0654)		
PERURBAN	.0005	(.0009)	.0020	(.0003)*
D-79	.22	(.02)*	.12	(.02)*
D-80	.46	(.02)*	.20	(.02)*
D-81	.63	(.03)*	.29	(.02)*
D-82	.88	(.09)*	.37	(.03)*
D-83	.73	(.08)*	.36	(.02)*
D-84	.72	(.08)*	.38	(.02)*
D-85	.63	(.08)*	.42	(.03)*
Sample size	43,534		27,083	
Log L	-46,673			
	.12	(.03)*		

Note: The variables in Tables A-1 and A-2 that were not defined in Table 5 are, EXPERIENCE = age-education-6; HUSEARN = husband's annual earnings/10,000; PAREDUCM = years of schooling of mother's mother; NE = New England; MA = mid Atlantic; SA = south Atlantic; ESC = east south central; WSC = west south central; ENC = east north central; MOUNT = mountain; (Pacific is the omitted category); PERCOMCO = percentage of county population aged 25+ completing college; D79 etc = year dummies; URBRES14 = dummy incidating whether respondent lived in an urban area at age 14; = correlation coefficient.

*Coefficient estimate is significantly different from zero at the 5 percent level.

Table A-2

Joint Maximum Likelihood Estimates of Bivariate Probit for Employment and Positive Child Care Costs and Selectivity Corrected Log Cost Model

	Employed		Positive Child Care Costs		Log Child Care Costs per Hour	
Intercept	-2.44	(.35)*	.78	(1.06)	-2.13	(.60)*
BLACK	-.17	(.04)*	.03	(.07)	-.27	(.08)*
RACEOTH	-.07	(.07)	.18	(.12)	-.19	(.10)*
NUMOTHAD	-.020	(.016)	-.030	(.027)	.033	(.022)
FORBORNP	.13	(.06)*	.16	(.09)		
EDUCATION	.127	(.009)*	-.030	(.034)	.047	(.033)
AGE	.051	(.007)*	.012	(.018)	.049	(.021)*
HUSEARN	.049	(.015)*	.054	(.023)*	.035	(.020)
NONWAGEI	-.129	(.107)	.119	(.175)	-.024	(.159)
SMSA	-.07	(.05)	.04	(.08)	-.057	(.072)
HEALTH	-.60	(.08)*	-.19	(.25)		
URBRES14	-.12	(.04)*	-.02	(.07)		
PAREDUCM	.033	(.006)*	.016	(.014)		
CENSUS REGIONS						
NE	-.06	(.10)	.01	(.14)	.13	(.11)
MA	-.07	(.07)	-.20	(.10)*	.11	(.10)
SA	.22	(.07)*	-.08	(.12)	.08	(.11)
ESC	.05	(.08)	-.11	(.13)	.12	(.12)
WSC	.29	(.07)*	-.07	(.13)	.11	(.10)
ENC	-.21	(.06)*	-.01	(.11)	.09	(.09)
WNC	.03	(.08)	-.05	(.12)	-.12	(.11)
MOUNT	.19	(.08)*	-.03	(.13)	-.21	(.11)
PERKIDL5	-.021	(.011)	-.019	(.018)	.026	(.024)
PERBLACK	.0013	(.0023)	-.0003	(.0035)	-.0045	(.0029)
PERCOMCO	.0073	(.0064)	.0146	(.0096)	-.0116	(.0092)
PERCOMHS	-.0024	(.0040)	-.0157	(.0003)*	.0093	(.0064)
PERFEMHD	-.017	(.008)*	-.0003	(.0131)	.031	(.010)*

Table A-2, continued

	Employed		Positive Child Care Costs		Log Child Care Costs per Hour	
PERMANUF	-.0058	(.0025)*	-.0008	(.0040)	-.0017	
PERTRADE	-.012	(.008)	.018	(.012)	-.009	(.010)
POVERTY	-.0041	(.0059)	-.0060	(.0090)	-.0105	(.0075)
UMEMRATE	-.027	(.007)*	-.008	(.014)	.004	(.011)
MEDINC	-.036	(.095)	-.063	(.141)	.215	(.127)
PERURBAN	.0035	(.0014)	.0015	(.0023)	-.0004	(.0018)
D-85	.34	(.11)*	-.77	(.18)*	-.29	(.22)
D-86	.39	(.12)*	-.08	(.20)	-.25	(.16)
PREDWAGE					-.029	(.087)
AGEC					-.123	(.009)*
Selectivity correction					-.123	(.307)
Sample size	7,221		3,342		1,217	
	-.28	(.41)				
Log L	-6,625					
R^2 (S.E.)					.15	(.66)

*Coefficient estimate is significantly different from zero at the 5 percent level.