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David Blau
Erdal Tekin

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David Blau
Department of Economics, University of North Carolina, Chapel Hill

Erdal Tekin
Department of Economics, Georgia State University and IZA, Bonn

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IZA

P.O. Box 7240
D-53072 Bonn
Germany

Tel.: +49-228-3894-0
Fax: +49-228-3894-210
Email: iza@iza.org

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ABSTRACT

The Determinants and Consequences of Child Care Subsidies for Single Mothers*

This paper provides an early analysis of child care subsidies under welfare reform. Previous studies of child care subsidies use data from the pre-welfare-reform period, and their results may not apply to the very different post-reform environment. We use data from the 1997 National Survey of America's Families to analyze the determinants of receipt of a child care subsidy and the effects of subsidy receipt on employment, school attendance, job search, and welfare participation. We analyze the impact on subsidy receipt of household characteristics such as family size and structure, and past participation in welfare. Ordinary least squares estimates show positive and significant effects of subsidy receipt on employment, school enrollment, and welfare participation. Two stage least squares estimates that treat subsidy receipt as endogenous and use county dummies as identifying instruments show much less evidence that subsidy receipt affects these outcomes.

JEL Classification: J13, I38

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Erdal Tekin
Department of Economics
Georgia State University
University Plaza
Atlanta, GA 30303
USA
Tel.: +1 (404) 651-3968
Fax: +1 (404) 651-4985
Email: tekin@gsu.edu

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1. Introduction

The 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) consolidated four different child care subsidy programs for low-income families into a single block grant, the Child Care and Development Fund (CCDF). The Act also substantially increased funding for child care subsidies, and gave states considerable flexibility in setting subsidy program rules. Furthermore, states were given permission to transfer up to 30 percent of their Temporary Assistance for Needy Families (TANF) block grant funds into the CCDF, and to spend additional TANF funds directly on child care subsidies. These changes indicate that policy makers view child care subsidies as an important part of welfare reform. In fiscal year 1999 states spent all of their CCDF allocation of around $5 billion, and spent directly on child care or transferred another $4 billion dollars from the TANF block. However, we know very little about whether child care subsidies have in fact contributed significantly to the goals of welfare reform.

This paper provides an early analysis of child care subsidies under welfare reform. The goal of the paper is to use household survey data from the early post-reform period to analyze the determinants of subsidy receipt and the effects of subsidy receipt on employment, welfare participation, and related outcomes. The analysis uses data on a sample of single mothers from the National Survey of America's Families (NSAF), conducted by the Urban Institute in 1997. This is the only available national household survey from the post-welfare-reform period that includes information about child care subsidies. Other recent post-welfare-reform studies of child care subsidies have relied exclusively on administrative data. An advantage of household survey data over administrative data is that information is available on both subsidy recipients and non-recipients. Determinants of receipt can therefore be analyzed, and the employment outcomes of recipients and non-recipients can be compared. The survey also includes more

detailed information on outcomes of interest than is usually available in administrative data. The NSAF sample includes a large number of current and former welfare recipients and other single-mother families, providing a basis for reliable inference for the target population of welfare reform. State of residence is identified in the NSAF, so we are able merge information on the characteristics and rules of state welfare and child care subsidy programs with the household data. For 13 of the largest states, county of residence is identified as well. This provides a source of within-state variation that can help identify the impact of child care subsidies.

We use the data to address two issues. First, how do household characteristics affect the likelihood of receiving a subsidy? Key household characteristics include family size and structure, and past participation in welfare. Second, how does subsidy receipt affect employment, school enrollment, job search, and welfare participation? In this part of the analysis we attempt to account for the likely possibility that unobserved determinants of receiving a subsidy are correlated with unobserved determinants of the outcomes of interest. The results indicate that past enrollment in cash assistance welfare programs and past receipt of a child care subsidy both have large positive effects on the likelihood of receiving a child care subsidy. Conditional on these two lagged dependent variables, and on household characteristics and state fixed effects, receiving a child care subsidy at the time of the survey is associated with an eleven percentage point higher rate of employment, a seven percentage point higher probability of enrollment in school, and no differences in unemployment or welfare receipt. However, two-stage least squares estimates using county dummies as instruments for subsidy receipt show smaller effects and larger standard errors, raising some doubt about whether the observed associations represent causal effects. The results of the analysis will be useful to policy makers and researchers in understanding the potential contribution of child care

subsidies to achieving welfare reform goals.

Section 2 of the paper describes the current structure of child care subsidy programs in the U.S., and section 3 reviews previous evidence on the effects of child care subsidies. Section 4 presents descriptive information from the NSAF, and section 5 describes the models we estimate. The results of the empirical analysis of subsidy receipt and effects are presented in section 6, and section 7 concludes.

2. Child Care Subsidy Programs

The programs discussed here provide subsidies for work-related child care expenses of children in low-income families.[1] Before 1988, the only federally funded means-tested child care subsidies were the child care disregard in Aid to Families with Dependent Children (AFDC) and the Title XX Social Services Block Grant.[2] The 1988 Family Support Act (FSA) mandated two new programs, AFDC Child Care (AFDC-CC) and Transitional Child Care (TCC). The AFDC-CC subsidy was intended to facilitate participation of welfare recipients in the Job Opportunities and Basic Skills (JOBS) program, an employment training program mandated by the FSA to move families off welfare to economic self-

[1]We do not consider early education subsidies such as Head Start and Title I-A that are designed to improve child outcomes. Such programs may provide work incentives, but because they do not require employment the incentives are clearly different from those of programs explicitly designed to encourage labor force participation. See Blau (2000) for a discussion of the work incentives of early education programs.

[2]The child care disregard allowed states to disregard child care expenses of up to $175 per month per child aged two or over ($200 for children under 2) from earned income in determining AFDC benefits (Committee on Ways and Means, 1998, p. 683). The Title XX Social Services Block Grant (TXX) subsidizes a wide variety of social services and gives states flexibility in how the funds are allocated across the various eligible services. On average, about 15 percent of TXX funds (roughly $300 million) have been spent on child care in recent years (Committee on Ways and Means, 1998, p. 720).

sufficiency. The goal of the TCC program was to help maintain employment by providing subsidies to families who had recently moved off welfare, for up to one year after leaving welfare. The Omnibus Budget and Reconciliation Act (OBRA) of 1990 introduced two more new programs, At-Risk Child Care (ARCC) and the Child Care and Development Block Grant (CCDBG). The ARCC program provided child care subsidies to families who might otherwise not have been able to work and would as a result be at risk of going on welfare. The CCDBG had two goals: provide more funds to subsidize employment-related child care expenses for low-income families, and subsidize quality-improvement activities and consumer education.

PRWORA consolidated the four programs created by FSA and OBRA into a single child care block grant program called the Child Care and Development Fund (CCDF). The main goal of the consolidated program is to facilitate the transition from welfare to work and help maintain employment of low-income parents. States can use CCDF funds to assist families with income up to 85 percent of state median income, but are free to use a lower income-eligibility criterion. Parents must be employed, in training, or in school, although some exceptions are permitted. In general, priority for CCDF funds is supposed to be given to families with very low incomes and children with special needs. Specifically, states must use at least 70 percent of their mandatory and matching funds[3] to serve families on welfare, families

[3]Federal CCDF funds are provided to the states in three "streams:" discretionary, mandatory, and matching. Discretionary and mandatory funds are distributed according to rules similar to those of the old programs, primarily based on the number of children and state income. These two streams do not require state matching funds. To receive funds from the matching stream, "a state must maintain its expenditure of state funds for child care programs at specified previous levels ('maintenance-of-effort' spending) and spend additional state funds above those levels." (U.S. General Accounting Office, 1998, p. 5).

in work activities who are moving off welfare, and families at risk of going on welfare. These correspond to the three groups previously served by the AFDC-CC, TCC, and ARCC programs, respectively. The CCDF also requires that a portion of the funds be used to assist working poor families who are not currently, recently, or likely future welfare recipients - the group previously served mainly by the CCDBG program. As part of the general increase in flexibility provided by PRWORA, states are permitted to transfer up to 30 percent of their Temporary Assistance for Needy Families (TANF) block grant funds to the CCDF to be used for child care, and can also use TANF funds directly for child care services without transferring the funds to CCDF.

States have substantial flexibility in designing their CCDF programs, including the income eligibility limit, co-payments by families, and reimbursement rates to providers. Only nine states set income eligibility at the maximum allowed by law, 85 percent of state median income. Seven states set the income eligibility limit at less than 50 percent of median income. States are permitted to waive fees (co-payments) for families with income below the poverty line, and there is substantial variation across states in use of this provision. Fees are determined in many different ways, including flat rates, percent of cost, percent of income, and combinations of these. States are required to have sliding scale fee structures, with fees that rise with family income. Federal guidelines for implementation of the CCDF law require that the subsidy rate be set at the 75^{th} percentile of the price distribution from a recent local market rate survey. Recent evidence suggests that in practice many states use out-of-date market rate surveys or set the subsidy rate lower than the 75^{th} percentile of the price distribution (Adams, Schulman, and Ebb, 1998, p. 23).

The CCDF is a capped entitlement, with no obligation to serve all eligible families. It is estimated that the CCDF served only 12-15 percent of eligible children in recent years (Administration for Children and Families, 1999, 2000). There is no systematic information available on how CCDF funds are allocated among eligible families. Schumacher and Greenberg (1999) summarize evidence from a number of studies of child care subsidy receipt by families who have left welfare in recent years. They report that in most states fewer than 30 percent of welfare leavers who are employed receive a child care subsidy. Lack of awareness of subsidies was reported to be high among these families. The studies also reported that the majority of these families were using informal child care by relatives. Jacobson (2000) also reports low subsidy use by welfare leavers in California.

3. Previous Evidence

Existing evidence on the determinants of receiving a child care subsidy and on the effects of child care subsidies is limited almost entirely to the pre-1996 period, before the major federal welfare reform. Concerning the determinants of subsidy receipt, Meyers and Heintze (1999) examined the use of child care subsidies in a sample of welfare recipients in four California counties in 1995. In their sample, 16 percent of employed mothers received a child care subsidy, 30 percent of mothers enrolled in education or training programs received a subsidy, and 34 percent of mothers in neither activity received a subsidy (including Head Start). The public subsidy system for child care in California was quite complex prior to PRWORA, with at least seven different subsidy programs. When mothers were asked why they did not receive subsidies from the programs for which they appeared to be eligible, the majority response for all three employment-related subsidy programs, one out of two education-and-training-related subsidies, and one

out of two child-education subsidies was that they were not aware of the program. The majority response for the other two subsidy programs was "aware of the program but did not apply." The acceptance rate for mothers who applied averaged 72% across all programs.

Fuller et al. (1999) estimated a model of the child care subsidy take-up decision of mothers enrolled in TANF using data collected in San Francisco, San Jose, and Tampa in 1998. Of the women in their sample who used any non-maternal child care, 37-44 percent received a subsidy, depending on the site. Presumably, all of the women in this sample were categorically eligible for a child care subsidy, but there is no way to determine whether the mothers not receiving a subsidy were rationed out or did not take up the subsidy offer. A regression analysis showed that a woman's knowledge of child care subsidy rules and participation in a TANF-sponsored job search class were positively associated with receiving a subsidy.

Concerning the effects of receiving a child care subsidy, several demonstration programs designed to help low-income families achieve economic independence included child care subsidies along with other benefits and services . These programs were conducted as part of welfare waiver evaluations prior to PRWORA, and used randomized assignment methods. However, in each case the child care subsidy was only one of several services provided as part of the program, so it is not possible to determine how much of the program impacts were due to the child care subsidy.[4]

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[4]Demonstrations and experiments that included child care subsidies were New Hope (Bos et al., 1999), the Teenage Parent Demonstration (Kisker et al., 1998), New Chance (Quint, Bos, and Polit, 1997), GAIN in California (Riccio et al., 1994), the National Evaluation of Welfare-to-Work Strategies, formerly known as the JOBS program (Hamilton et al., 1997; Hamilton, Freedman, and McGroder, 2000), the Minnesota Family Investment Program (Miller et al., 1997), the Florida Family Transition Program (Bloom et al., 1999), and the Gary, Seattle, and Denver Income Maintenance

Three studies have estimated the impact of actual child care subsidies on employment. Berger and Black (1992) evaluated the employment impact of two Kentucky child care subsidy programs funded by Title XX in 1989. Their estimates indicate that the average weekly subsidy of $46 induced an increase in maternal employment of 8.4 to 25.3 percentage points, depending on how selection into receiving a subsidy is modeled. Berger and Black used samples from the subsidy waiting list and the Current Population Survey, as well as comparisons of behavior before and after entering the waiting list, to control for selection effects. Meyers, Heintze, and Wolf (2000) used data from a sample of California AFDC recipients in four counties during 1992-1995 to analyze the impact of subsidy receipt on employment. The predicted probability of receiving a subsidy, estimated in a first stage model, had a positive coefficient in an employment probit. Simulations indicate that as the probability of subsidy receipt increases from 0.0 to 0.5, the employment probability rises from .210 to .727 at the sample means of the other regressors. Meyers et al. do not have comparison groups available such as those used by Berger and Black, so it is difficult to determine the reliability of their estimates.

Gelbach (1999) estimated the impact on employment of the implicit child care subsidy provided by free public kindergarten for five year old children. To identify the effect of the subsidy, Gelbach exploited variation in quarter of birth of children and the fact that all states impose a date-of-birth requirement for entry to kindergarten. Gelbach used quarter-of-birth dummies as instrumental variables for enrollment in public school. He used data from the Public Use sample of the 1980 census on single mothers whose youngest child was aged five at the time of the census on April 1, 1980. His instrumental variable

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Experiments (Robins and Speigelman, 1978).

estimates indicate that access to free public school increased the employment probability by five percentage points at the interview date and by four percentage points during calendar year 1979. He also finds positive effects on hours of work per week, weeks worked per year, and wage-salary income in 1979; and a negative effect on the probability of receiving public assistance in 1979.

The drastic nature of the 1996 welfare reform may make the pre-reform results of these three studies less relevant for predicting responses to current and future subsidies. Less emphasis was placed on moving welfare participants into employment before PRWORA. A mother might have been able to turn down a child care subsidy offer before PRWORA and remain out of the labor force without losing her welfare benefit. A mother who turned down a child care subsidy today would be more likely to lose eligibility for welfare. It seems plausible that a mother who is going to lose her welfare eligibility in any case would be likely to accept a subsidy offer and join the labor force. So the results of studies conducted in the pre-PRWORA environment will not necessarily be a good guide to behavior in the post-PRWORA era.

A final source of evidence on the impact of child care subsidies comes from studies of the effect of the price of child care. More than a dozen studies have estimated the effect of the price of purchased child care on the employment behavior of mothers. One of the motivations for this literature is to infer how child care price subsidies would affect employment decisions. Whether inferences about the effects of subsidies drawn from this literature are useful depends on several factors. First, if there are substantial costs to taking up a subsidy, either in the form of time costs required to negotiate the subsidy bureaucracy or psychic costs ("stigma") of participating in a means-tested program, then price effects on employment may not be a reliable guide to subsidy effects. Second, the price effects estimated in this literature are generally assumed to be linear, while most subsidies are nonlinear. Nonlinearity of a subsidy does not affect the

qualitative result that a child care price subsidy increases the incentive to be employed, but it could affect the magnitude of the employment effect. Third, issues of specification and estimation of econometric models of price effects could affect the inferences drawn from such effects. Estimated price elasticities reported by the authors of the studies range from .06 to -1.26. Blau (2000) reviews these studies and concludes that differences in specification and estimation play an important role in producing variation in the estimates.

4. Data

The National Survey of America's Families (NSAF) was conducted by the Urban Institute between February and November 1997.[5] It was designed to analyze the consequences of devolution of responsibility for social programs from the federal government to the states. The survey was conducted by telephone on a sample derived primarily from random-digit dialing.[6] Residents of 13 states[7] were over-sampled in order to allow detailed within-state analysis, and low-income households (income less than twice the federal poverty level) were over-sampled as well. The full NSAF sample includes 44,461 households. We select a subsample from the 13 over-sampled states consisting of households headed by an unmarried mother with at least one child under age 13. We focus on single mothers because they are the main target group for welfare reform, and we use the 13 over-sampled states because county of

[5]Another round of the NSAF was conducted in 1999, with a new sample. Complete data from the 1999 round have not yet been released to the public.

[6]Households without a telephone were also included in the sampling frame. Cellular telephones distributed by the survey organization were used to conduct interviews with such households.

[7]Alabama, California, Colorado, Florida, Massachusetts, Michigan, Minnesota, Mississippi, New Jersey, New York, Texas, Washington, and Wisconsin.

residence is identified for these states. After excluding cases with missing data, we have a sample of 3,653 households.

The main variables of interest are child care subsidies, employment status, and welfare status. The mother is asked whether she receives any assistance paying for child care, including assistance from a welfare or social services agency, her employer, and a non-custodial parent. We code a family as receiving a child care subsidy if the mother reports that a welfare or social service agency pays for all or part of the cost of child care for any of the children in the family. Table 1 shows that 10.5 percent of our sample receives a subsidy by this measure. The Administration for Children and Families (1999, 2000) estimates that 12-15 percent of eligible families received a CCDF subsidy in 1998-99. We cannot determine eligibility in our sample, and undoubtedly some of the families in our sample are ineligible as a result of income in excess of the eligibility threshold[8]. So a ten percent subsidy coverage rate is not implausible. Employment is measured by whether the mother is employed as of the survey date, and welfare receipt is measured by whether the family receives cash assistance from AFDC or its successor program TANF as of the survey date. The employment rate is 67.9 percent and the welfare participation rate is 21.9 percent. The NSAF also records whether the family received welfare in the year prior to the survey date, and whether the family received a child care subsidy during the first three months after leaving welfare since January 1995, if the family was previously on welfare. In some specifications of our models we condition on these lagged dependent variables. 29 percent of the sample received welfare at some time during the 12 months prior to the survey, and four percent received a child care subsidy in the first three months after

[8]We include all single mothers regardless of income, in order to avoid conditioning on income from employment and welfare, which make up the vast majority of income for our sample.

leaving welfare since January 1995.

We expect that subsidy recipients would have a higher employment rate than non-recipients, since most child care subsidies are conditioned on employment or employment-related activities such as education, training, and job search. Table 1 shows that the employment rate is 70.3 percent among subsidy recipients and 67.6 percent among non-recipients. This is a surprisingly small difference, and suggests that a substantial proportion of subsidy recipients may be in school, training, or unemployed. To explore this issue, we tabulated the reason for not working offered by mothers in our sample who received a child care subsidy and were not employed. Forty three percent reported attending school as the reason for not being employed, and another 19 percent reported being unable to find work, actively seeking work, or recently separated from a job. We refer to the latter group as "unemployed" for brevity. The remaining 38 percent reported "taking care of family," and other reasons that seem inconsistent with receiving a child care subsidy that has an employment or employment-related activity requirement.[9] It is not clear why these women are receiving a child care subsidy. One possibility is that their children are in Head Start or some other subsidized preschool program that does not have an employment requirement. The NSAF reports the type of child care used during the month prior to the survey, and includes Head Start as an option. However, only 14 percent of the mothers who receive a subsidy and are not employed, in school, or unemployed report using Head Start.

In order to examine the effects of child care subsidies on employment-related activities, we analyze a binary indicator for being enrolled in school (conditional on not being employed) and a binary indicator

[9]The other reasons include ill or disabled, couldn't afford child care, transportation problem, and being in prison.

for being unemployed . As shown in Table 1, 4.9 percent of the sample are enrolled in school, and 6.1 percent are unemployed.

Table 1 shows that child care subsidy recipients are much more likely to be on welfare than non-recipients, 35.2% versus 20.4%. This is consistent with the stipulation of the CCDF that priority for subsidies should be given to families on welfare, families in work activities who are moving off welfare, and families at risk of going on welfare. The lower panel of Table 1 shows that child care subsidy receipt is almost twice as common for families on welfare (16.9%) compared to families not on welfare (8.7%). However, the employment rate of mothers on welfare is only about 26 percent compared to 80 percent for mothers not on welfare.

In the analysis that follows we condition on a small set of characteristics of the mother and her family, including her age, race, ethnicity, health status, education, presence of children by age, family structure, and nonwage income. Descriptive statistics for these variables are given in Table 2. In some specifications we include state dummies as well.

5. Model

Our goal is to model receipt of a child care subsidy, and the effect of subsidy receipt on outcomes such as employment and cash assistance. The econometric model consists of the following pair of equations:

$$S_i = X_i ß + Z_{ci} ?_c + e_i \quad (1)$$

$$O_i = a S_i + X_i d + Z_{Oi} ?_O + ?_i \quad (2)$$

where S_i is a binary indicator of subsidy receipt, O_i is a binary outcome such as an indicator of whether the mother is employed, X_i is a vector of family characteristics, the Z's are vectors of policy variables and

other characteristics of the community of residence of the family, e_i and $?_i$ are disturbances, and ß, the ?'s, a, and d are parameters. We specify linear equations for ease of interpretation, despite the binary nature of the dependent variables. Equation (1) is a reduced form model of the receipt of a child care subsidy. The demand for child care subsidies by families is determined by factors such as the price of child care, nonwage income, the mother's wage rate, preferences for consumption relative to leisure, stigma associated with participating in a means-tested subsidy program, the psychic and time costs of establishing and maintaining eligibility for the subsidy, and so forth. These are determined in turn by observed family characteristics (X), observed features of the state and local child care subsidy system and the state and local economy (Z_c), and unobserved family and state-local characteristics (e). However, child care subsidies are rationed because the program is funded at a level too low to serve all eligible families. Thus not all families who demand a child care subsidy receive one. Subsidies are rationed on the basis of observed family characteristics (X), observed features of the state and local child care subsidy system and economy (Z_c), and unobserved family and state-local characteristics (e). Thus (1) is a reduced form - we cannot distinguish the demand effects and supply effects of X and Z_c, just the net effects on subsidy receipt.

Equation (2) is a model of the effect of receiving a child care subsidy on an outcome of interest such as employment. We would like to interpret a as the "causal effect" of receiving a subsidy on the outcome of interest. However, a does not have a well-defined economic interpretation in terms of a behavioral model. We follow this approach for two reasons: we do not have the data needed to estimate the parameters of a behavioral model[10], and this is the approach followed by previous studies of child care

[10]We do not have information on the amount of the subsidy, although in principle we could estimate it using the program rules and the relevant family characteristics. A structural model would

subsidies. If all families that receive a subsidy get the same dollar amount of assistance, and if all families have the same response to receiving a subsidy, then a can be interpreted as the ceteris paribus effect of being assigned a subsidy *and* accepting it. This parameter is of interest, but is not a fundamental parameter of a behavioral model. The Appendix presents a formal behavioral model of the determinants of child care subsidy receipt and the effect of subsidy receipt on employment. We show that a depends on both preference parameters and the parameters of the mechanism used by administrators to assign subsidies.

The literature on child care subsidies discussed above emphasizes that e_i and $?_i$ are likely to be correlated. A mother who is strongly motivated to work may also be motivated to seek a child care subsidy, imparting a positive correlation. Alternatively, the least employable mothers may be singled out for subsidies by administrators of the subsidy system, imparting a negative correlation. Our approach to identification is based on exclusion restrictions. One might think that the rules of the state child care subsidy system would affect whether a family receives a subsidy, but conditional on receiving a subsidy would not affect the employment decision. In this case such variables would be included in Z_{ci} but could be excluded from Z_{oi}. However, we show in the Appendix that in general this is not true. Rules that determine eligibility affect how much a mother can earn and therefore the value of being employed and receiving a subsidy. Rules that determine the subsidy amount affect the value of being employed and receiving a subsidy. And since these rules vary only across states we would have to assume that there are no unobserved state-level determinants of the employment and other outcomes, an implausible assumption even if other state-level

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contain the price of child care, the mother's wage rate, and nonwage income. We have substituted the determinants of these variables, so (2) is really a quasi-reduced-form model. This approach allows us to avoid the difficult problems of assigning wages and prices to non-workers and non-payers, respectively. See Tekin (2001) for an analysis that deals with these issues.

covariates are included. In fact, we found that adding state fixed effects to equation (2) always improved the fit compared to state-level covariates.[11]

The model we present in the Appendix suggests that the only valid identifying instruments in this model are factors that determine how subsidies are rationed. To identify a, we assume that these factors are determined at the county level, and we treat county dummies as identifying instruments. We control for state fixed effects in the employment and other outcome models, and therefore rely on within-state variation in subsidy receipt by county to identify the effects of subsidies. It is plausible that the degree of rationing and subsidy receipt vary across counties within states because local program administrators generally have considerable flexibility in allocating subsidies (Carroll, 2001). Layzer and Collins (2000) report substantial variation across counties in the structure of the child care subsidy administration (see also Blank et al., 2001, and Mitchell et al., 1997).[12] We show below that county dummies have good explanatory power in first stage estimates of equation (1).

However, the validity of our estimates hinges on the assumption that there are no unobserved county-level determinants of employment within states, i.e., that county dummies can be excluded from

[11]We also found that when we included in equation (1) state policy variables such as the CCDF reimbursement rate, income-eligibility level, child care subsidy expenditure per capita, and other state-level variables such as the unemployment rate, median income, and the child poverty rate. These variables had effects on subsidy receipt that were jointly and individually insignificantly different from zero. In contrast, state dummies have effects in (1) that are jointly significantly different from zero. We attribute the lack of effects of the policy variables together with strong effects of state dummies to the fact that all states ration subsidies, and rationing is the main determinant of subsidy receipt. Rationing mechanisms appear to differ across states in ways that are not captured by program rules and policies.

[12]Lemke et al. (2000) analyze the work behavior of child care voucher recipients in Massachusetts, using variation in local child care policy and other local variables to explain employment outcomes.

equation (2). If this assumption is incorrect then our Two-Stage Least Squares (2SLS) estimates will be biased. For example, if local administrators who are relatively successful in getting child care subsidies to their clients are also good at getting clients into jobs, then county dummies should not be excluded from the employment equation. Or if the tightness of the county labor market is for any reason correlated with county child care subsidy rationing policy, then our identification strategy is invalid. In order to guard against this possible threat to the validity of our 2SLS estimates, we include in equation (2) 21 county-level variables that measure demographic and labor market characteristics of counties.[13]

This model is similar to those estimated in previous analyses of the effects of child care subsidies, although the source of identification is different in each case. Gelbach's (1999) model is identified by quarter-of-birth of five year old children, which affects enrollment in kindergarten, but (by assumption) not employment. Meyers, Heintze, and Wolf (2000) identify the effect of a child care subsidy by excluding from the employment equation an indicator of how well the mother knows the rules of the child care subsidy system. Berger and Black (1992) use several comparison groups to sweep out various fixed effects. Their approach achieves identification through covariance restrictions: the disturbances are assumed to consist of a common fixed effect and independent idiosyncratic components. Sweeping out the fixed effects by assumption removes the source of the correlation between the errors of the subsidy and employment equations.

[13]These variables were collected from the City-County Data Book and County Business Patterns, and include population size; the age, race, ethnic, education, and sex structure of the population; median income; percent in poverty; land area, population density; employment and employment growth; local government employment; payroll; and the number of establishments.

6. Results

Table 3 presents estimates of equation (1), the model for receipt of a child care subsidy. The first column presents estimates without lagged dependent variables. The likelihood of subsidy receipt decreases with the mother's age until age 43. Blacks are more likely to receive a subsidy than whites and other races (other race is the reference group), and Hispanics are slightly less likely to receive a subsidy than non-Hispanics, other things equal. Mothers who have completed high school are about three percentage points more likely to receive a subsidy than high school dropouts (the reference group). Mothers with a child aged 0-5 but no child 6-12 are 3.5 percentage points less likely to receive a subsidy than mothers with children in both age groups (the reference category), and mothers with a child 6-12 and no child 0-5 are 9 percentage points less likely to receive a subsidy than mothers with children in both age groups. Higher non-wage income reduces the likelihood of receiving a subsidy, but the effect is quite small. The specification reported in Table 3 includes 285 county dummies, but the coefficient estimates are not shown. A specification test rejects the hypothesis that the effects of the county dummies are jointly zero with a p-value < .01.

The second column adds indicators for whether the mother participated in welfare at any time during 1996, and whether she received a child care subsidy upon exiting welfare. Welfare participation in the recent past is associated with a 6.8 percentage point increase in the likelihood of subsidy receipt. Past child care subsidy receipt is associated with a 31 percentage point increase in the likelihood of subsidy receipt. These results clearly indicate strong persistence over time in subsidy receipt associated with participation in welfare.

Table 4 presents estimates of the effect of receiving a child care subsidy on employment, school

attendance, unemployment, and welfare participation. Each row presents estimates of a in equation (2) from a different specification or estimated by a different method. The first row in the upper panel presents OLS estimates from a specification of equation (2) that does not include any state-level variables, county-level variables, or lagged dependent variables. The complete results from this model are given in the Appendix. Receipt of a child care subsidy is associated with a five percentage point increase in the likelihood of employment, an eight percentage point increase in the likelihood of attending school, a one point decrease in the likelihood of unemployment, and a ten percentage point increase in the likelihood of receiving welfare. All of the estimates except for unemployment are significantly different from zero. Thus the estimates suggest that child care subsidies are associated with greater employment and school attendance but also greater welfare participation. Most mothers who are on welfare do not work, and vice versa: only 5.7 percent of the sample works and receives welfare simultaneously. Another 5.7 percent attend school or are unemployed at the same time as receiving welfare, so 11.4 percent of the sample is in a work-related activity at the same time as being on welfare. The fact that receiving a child care subsidy is associated both with increased work-related activities and increased welfare participation probably results from the fact that current and former welfare recipients are intended to receive priority for a subsidy, and the subsidy has a work requirement.

The second row presents results from OLS estimates of a specification that includes state dummies. Adding the state fixed effects reduces the welfare impact slightly and has virtually no effect on the estimates for the other outcomes. The third row is the same as the first row except that it adds lagged dependent variables (to both the first and second stage models): welfare receipt in 1996 and child care subsidy receipt following exit from welfare. This increases the effect of child care subsidy receipt on employment from .05

to .11, slightly reduces the effect on school attendance, and slightly increases the unemployment effect. Conditioning on these lagged variables may control for some sources of unobserved heterogeneity that are correlated with employment and subsidy receipt. The substantial increase in the effect of child care subsidy receipt on employment suggests that the unobserved variables are negatively correlated with receipt of a subsidy. Adding state fixed effects causes the effect of child care subsidy receipt on welfare participation to fall to zero. Conditional on past welfare receipt, receiving a child care subsidy does not affect the likelihood of current welfare receipt. This suggests that child care subsidy receipt does not cause increased welfare receipt. Rather, child care subsidy receipt is more likely when a family has been on welfare in the past, and past welfare receipt is strongly associated with current welfare receipt. The fourth row is just like the second except for adding the lagged dependent variables, and the estimates are very similar to those in row 3.[14]

The lower panel of Table 4 presents 2SLS estimates of the same four specifications as in the upper panel, using county dummies as identifying instruments. The standard errors in the 2SLS estimates are two to three times larger than in the OLS models, so inferences are less precise.[15] The estimated impact of child care subsidy receipt on employment in the 2SLS estimates ranges from -.074 to +.061 but the coefficient estimate is always less than its standard error. In the cases with positive 2SLS estimates, the point estimates

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[14]We estimated models in which Head Start cases were reclassified as not receiving a subsidy. This had negligible effects on the child care subsidy coefficient estimate.

[15]There are 285 counties included in the 13-state sample used here, and there is considerable variation in the child care subsidy receipt rate across counties within each of the 13 states. The coefficient of variation of the county-level receipt rate ranges from .59 to 1.99 and averages 1.27. The (unweighted) average number of sample members per county is 14.7, which is relatively small and accounts for the increase in the standard errors in the 2SLS estimates.

are smaller than the corresponding OLS estimates, suggesting that the OLS estimates were biased upward. We cannot reject the hypothesis of no impact of child care subsidies on employment, but the results are somewhat inconclusive due to the increase in the standard errors. The estimated impact on employment of .046 in row 8 is similar to Gelbach's estimate of .05, and is much smaller than the estimates of Berger and Black (.08 to .25) and Meyers, Heintze, and Wolf (.52 for an increase in the probability of subsidy receipt from 0.0 to 0.5). Gelbach's census sample is similar to our NSAF sample because both are from population surveys, while the samples used in the other two studies are derived from administrative records.

The 2SLS results for school attendance are positive and not much different from the OLS estimates, and in the specifications without the lagged dependent variables we reject the hypothesis of no impact. Hence the finding of a positive impact of child care subsidy receipt on school attendance seems fairly robust. The effects on unemployment are generally small and never significantly different from zero, similar to the OLS estimates. Finally, the 2SLS estimates of the effect of child care subsidy receipt on welfare participation are positive, much larger than the corresponding OLS estimates, and three of the four estimates are significantly different from zero. However, controlling for both state fixed effects and lagged welfare participation yields an estimate (.055) that is the smallest of the four and is smaller than its standard error. The 2SLS results for welfare are thus similar to the OLS estimates in showing that the strong positive association between welfare and child care subsidy receipt is probably due to unobserved heterogeneity rather than a causal effect. Our results are quite different from those of Gelbach, who found a subsidy effect of -.04 on receipt of public assistance.

The estimates in Table 4 do not control for the 21 county-level variables described in the previous section. Adding these variables to the models shown in Table 4 resulted in very small changes in the

estimated impact of child care subsidies. None of the inferences drawn from the results in Table 4 are changed at all by including these variables. And specification tests indicated that conditional on including the state dummies, the hypothesis that the county-level variables can be excluded from the outcome equations was never rejected for any model for either the OLS or 2SLS estimates. Hence as far as we can tell, the results are not biased by omission of county characteristics.

In view of the fact that child care subsidy receipt is associated with both increased employment (and school attendance) and increased welfare participation, it is of interest to examine the welfare-employment connection in more depth. To do this, we estimated a multinomial logit model of choices among various combinations of welfare, employment, and other work-related activities. The dependent variable is defined as follows:

Category	Welfare	Work	Other work-related activity (job search, school)
1	Yes	Yes	
2	No	Yes	
3	Yes	No	Yes
4	No	No	Yes
5	Yes	No	No
6	No	No	No

In this classification scheme, work takes precedence over other work-related activities; if a mother is employed then she is classified in category 1 or 2 regardless of whether she also attends school. Only if she is not employed do we then classify her by whether she is in a work-related activity (3 or 4) or not (5 or 6). This scheme allows us to determine whether the effect of receiving a child care subsidy on employment

and work-related activities varies by welfare status. The regressors in the model are the same as those in the appendix table, corresponding to the row 1 specification in Table 4. The estimated coefficients on the child care subsidy variable and associated simulation results are shown in Table 5. The first set of estimates uses the actual child care subsidy indicator, while the second uses the predicted value from the first stage model from Table 3. The latter corresponds to the 2SLS approach, although the standard errors are not corrected for the first stage estimation. Four of the five subsidy coefficient estimates are significantly different from zero in the specification using the actual subsidy variable. Child care subsidies are associated with increased employment *conditional* on receiving welfare (row 1), but have a small negative effect on employment conditional on not receiving welfare (row 2). Similarly, child care subsidies have a positive effect on work-related activities conditional on receiving welfare (row 3) but no effect on such activities when not on welfare (row 4). The results using the predicted child care subsidy are similar in sign and much larger in magnitude. These findings suggest that child care subsidies succeed in increasing employment and employment-related activities of welfare recipients but have little impact on employment of non-recipients. The CCDF is intended to give priority for subsidies to current and former welfare recipients, and the evidence presented here indicates that this strategy does help members of this group.

8. Conclusions

Child care subsidies are an important part of welfare reform, and funding for such subsidies has grown rapidly in the last few years. Yet there is little information available about whether child care subsidies have in fact contributed significantly to the goals of welfare reform. This paper presents evidence on child care subsidies received by single mothers with a child under age 13 from data collected in 1997,

the first year of welfare reform. Child care subsidies were received by about 10 percent of the sample. Subsidy recipients were about 3 percentage points more likely to be employed than non-recipients, and about 5 percentage points more likely to be employed after controlling for a small set of family characteristics. Subsidy recipients were also about eight percentage points more likely to be enrolled in school, no more likely to be unemployed, and about 15 percentage points more likely to be on welfare than non-recipients. The school enrollment and unemployment differences are not affected by controlling for family characteristics, while the welfare participation difference falls to 10 percentage points. These figures along with the multinomial logit analysis suggest that child care subsidies encourage employment and school enrollment among welfare recipients, but not among non-recipients.

The child care subsidy program created as part of the welfare reform of 1996 (the CCDF) is intended to facilitate participation in employment and employment-related activities such as education and training. Thus it is not surprising that a mother is more likely to be employed or in school if she receives a child care subsidy. However, the guidelines for implementing the CCDF state explicitly that current and former welfare recipients and families at risk of reliance on welfare should have priority for child care subsidies. This may explain why subsidy recipients are more likely to be on welfare than non-recipients. Welfare participants are much less likely to be employed than are non-participants, but the increase in employment associated with receiving a child care subsidy among welfare recipients is larger than among non-recipients.

There are several potentially promising avenues for further research on the determinants and consequences of child care subsidy receipt. The most pressing need is for survey data with information on whether families without a subsidy were ineligible, eligible but not offered a subsidy, or eligible and offered

a subsidy but did not take it up. This would make it possible to do a more convincing analysis of the causal impact of subsidy receipt. A second useful approach would be to combine survey data with administrative records from the subsidy program, as in Berger and Black (1992). This would provide the possibility of constructing comparison groups, such as families on waiting lists for a subsidy. Finally, an experiment in which eligible families are randomly assigned to receive a child care subsidy may offer the best opportunity to determine the impact of child care subsidies on employment and welfare participation.

Appendix

We develop a simple static model of behavior as a basis for specifying an empirical model. Assume that a young child requires continuous care by an adult. The mother provides child care during her leisure hours. During her work and work-related hours she can receive free child care from a relative or purchase child care in the market, but she cannot care for the child while working, attending school, or engaging in other work-related activities. The relative divides her time between child care and leisure, with employment ruled out. For simplicity, assume that all non-maternal child care is either unpaid or purchased, but not a combination of the two. We focus on work, work-related activities, and welfare choices in the empirical analysis.[16] A child care subsidy can be received if the mother is employed or if she is not employed but is in a work-related activity such as education or job search. There may be direct disutility from receiving welfare or a child care subsidy, as a result of stigma. A subsidy can be received only if income is below the subsidy eligibility limit *and* the family is offered a subsidy. Welfare can be received only if income is below the welfare eligibility limit, but for simplicity we assume there is no rationing of welfare assistance (i.e., no time limits or sanctions). We assume that a mother can either work or be in some other work-related activity, but she cannot do both. She can receive welfare while working or in a work-related activity, or while doing neither. We model work-related activities as providing utility, which is an ad hoc way of capturing the value to the mother of future wage increases caused by education, training, and job search. The utility function, time constraints, budget constraint, and non-negativity constraints are as follows:

[16]We do not empirically analyze the choice of paid versus unpaid care or the employment decision of the relative, but these choices are included in the theory to account for the use of unpaid child care.

$$U = U(c, R_m, R_r, a, q_s s, q_W W)$$

$$R_m + h + a = 1, \; R_r + I = 1, \qquad H + I = h + a, \qquad IH = ha = 0$$

$$c = Y + hw - pH \qquad \text{if } s=0 \text{ and } W=0$$

$$c = (Y + hw)(1-t_s) - (p-r)H \qquad \text{if } s=1 \text{ and } W=0, \text{ where } Y + hw \# E_s$$

$$c = B + (Y+hw)(1-t_W) - pH \qquad \text{if } s=0 \text{ and } W=1, \text{ where } Y + hw \# E_W$$

$$c = B + (Y+hw)(1-t_W-t_s) - (p-r)H \qquad \text{if } s=1 \text{ and } W=1, \text{ where } Y + hw \# \min\{E_s,E_W\}$$

$$0 \# R_m, h, R_r, I, H, a \# 1,$$

where:

U	=	utility
c	=	consumption
R_m	=	the mother's leisure hours
R_r	=	the relative's leisure hours
a	=	the mother's hours spent in work-related activities (excluding employment)
q_s	=	the disutility of receiving a subsidy
q_W	=	the disutility of receiving welfare
s	=	binary indicator of subsidy receipt
W	=	binary indicator of welfare receipt
h	=	the mother's hours of work
I	=	hours of unpaid child care by the relative
H	=	hours of paid child care purchased in the market
Y	=	nonwage income
w	=	the mother's wage rate
p	=	the price per hour of child care
t_s	=	the rate at which child care benefits are reduced as earnings increase
r	=	the subsidy rate per hour of child care if earnings are zero
E_s	=	the income eligibility limit for a child care subsidy
B	=	the welfare benefit if not employed
E_W	=	the income eligibility limit for welfare
t_W	=	the rate at which welfare benefits are reduced as earnings increase
R	=	a binary indicator =1 if an eligible family is offered a subsidy, =0 otherwise.

The family chooses R_M, h, *a*, R_r, I, H, c, W, and s to maximize utility subject to the constraints.

There are four scenarios to consider.

1. The family is ineligible for welfare regardless of hours worked ($Y>E_W$), and is either ineligible for a child care subsidy regardless of hours worked ($Y>E_s$) or is eligible but rationed out ($Y\#E_s$, R=0). In this case s=W=0 because subsidy and welfare receipt are not part of the choice set. The family then chooses from among the first five discrete alternatives listed in Appendix Table A1.

2. The family is ineligible for welfare ($Y>E_W$), potentially eligible for a subsidy, and a subsidy is offered ($Y\#E_s$, R=1). In this scenario the family makes a choice from the first seven alternatives listed in the table. Alternatives (1)-(5) are the same as in the first scenario. In alternatives (1), (2), and (4) no paid child care is used, so no subsidy is received. In alternatives (3) and (5) the family pays for child care and is therefore eligible for a subsidy, but chooses not to take up the subsidy. In alternatives (6) and (7) the subsidy is accepted and hours of work are low enough so that income does not exceed the eligibility limit.

3. The family is eligible for welfare ($Y<E_W$), and potentially eligible for a subsidy, but a subsidy is not offered ($Y\#E_s$, R=0). In this scenario the family faces alternatives 1-5 and 8-12. Alternatives 8-12 are the same as 1-5 except for welfare receipt. In alternatives 8-12, hours of work are low enough so that income does not exceed the welfare eligibility threshold.

4. The family is eligible for welfare ($Y<E_W$), potentially eligible for a subsidy, and a subsidy is offered ($Y\#E_s$, R=1). In this scenario the family faces all 14 of the alternatives listed in the table. The new alternatives in this scenario are 13-14, in which the family receives both welfare and a child care subsidy.

The value of receiving a subsidy in this model is

$$V(s=1) = \text{Max}\{V_6(Y, E_s, p, r, w, q_s, t_s), V_7(Y, E_s, p, r, q_s, t_s),$$

$$V_{13}(Y, E_s, p, r, w, q_s, t_s, E_W, q_W, t_W, B), V_{14}(Y, E_s, p, r, q, t_s\, E_W, q_W, t_W, B)\}$$

where V_i is the indirect utility function associated with alternative i. The value of not receiving a subsidy is

$$V(s=0)=\text{Max}\{V_1(Y),V_2(Y, w), V_3(Y, w, p), V_4(Y), V_5(Y,p), V_8(Y, E_W, q_W, t_W, B),$$

$$V_9(Y, w, E_W, q_W, t_W, B), V_{10}(Y, w, p, E_W, q_W, t_W, B), V_{11}(Y, E_W, q_W, t_W, B),$$

$$V_{12}(Y, p, E_W, q_W, t_W, B)\}.$$

A subsidy is received if $V(s=1) > V(s=0)$ *and* $Y+wh^* \# E_s$ *and* $R=1$, where h^* is optimal hours of work. Otherwise a subsidy is not received. A reduced form model of subsidy receipt derived from this framework therefore has the form

$$s=s(Y, E_s, p, r, w, q_s, t_s, E_W, q_W, t_W, B, R). \qquad \text{(A1)}$$

The probability of employment *conditional* on receiving a subsidy is

$$\Pr(e=1|s=1)=\Pr\{\max\{V_6(Y, E_s, p, r, w, q_s), V_{13}(Y, E_s, p, r, w, q_s, t_s, E_W, q_W, t_W,B)\}$$

$$> \text{Max}\{V_7(Y, E_s, p, r, q_s), V_{14}(Y, E_s, p, r, q, t_s E_W, q_W, t_W, B)\})$$

The probability of employment conditional on not receiving a subsidy is

$$\Pr(e=1 \mid s=0) = \Pr(\text{Max}\{V_2(Y, w), V_3(Y, w, p), V_8(Y, E_W, q_W, t_W, B),$$

$$V_9(Y, w, E_W, q_W, t_W, B), V_{10}(Y, w, p, E_W, q_W, t_W, B)\}$$

$$> \text{Max}\{V_1(Y),V_4(Y),V_5(Y,p), V_{11}(Y, E_W, q_W, t_W, B), V_{12}(Y, p, E_W, q_W, t_W, B)\})$$

Hence the probability of employment conditional on subsidy receipt status has the form

$$e = e(s, Y, E_s, p, r, w, q_s, t_s, E_W, q_W, t_W, B) \qquad \text{(A2)}$$

Models for work-related activity, welfare, and combinations of the outcomes have the same form as (A2). E_s appears in the employment model because in alternatives 6-7 and 13-14 a subsidy can be received only if earnings plus other income is less than the eligibility limit. And r and t_s appear because the value of the subsidy influences the relative attractiveness of employment. This demonstrates the assertion in the text that

subsidy program rules cannot be excluded from the employment outcome equation.

In principle, there are two possible estimation strategies for this model. One is to estimate the multinomial discrete choice model as specified above. Unfortunately, this is not feasible because we do not observe R, the rationing indicator. R determines the choice set (i.e., which of the four scenarios described above is relevant). Without this information, we would be forced to assume that R=1 for everyone, resulting in people who have been rationed out of a subsidy being incorrectly assumed to have the option of taking up a subsidy.

The other alternative is to estimate the system of equations (A1)-(A2) by Two Stage Least Squares (2SLS). Notice that the employment probability conditional on subsidy status does not depend on R, so R is in principle a valid identifying instrument. We do not observe R, but we assume that R can be proxied by county dummies. For this strategy to produce consistent estimates, R must not correlated with any variables in (A2) except for s.

References

Adams, Gina, Karen Schulman, and Nancy Ebb (1998). "Locked Doors: States Struggling to Meet the Child Care Needs of Low-Income Working Families," Washington D.C.: Children's Defense Fund, March.

Administration for Children and Families (1999). "Access to Child Care for Low-Income Working Families," http://www.acf.dhhs.gov/news/ccreport.htm, Washington D.C.

Administration for Children and Families (2000). "New Statistics Show Only Small Percentage of Eligible Families Receive Child Care Help," http://www.acf.dhhs.gov/news/ccstudy2.htm, Washington D.C.

Berger, Mark C., and Dan A. Black (1992). "Child Care Subsidies, Quality of Care, and the Labor Supply of Low-Income Single Mothers," *Review of Economics and Statistics* 74 (4), November: 635-642.

Blank, Helen, Andrea Behr, and Karen Schulman (2001). "State Developments in Child Care, Early Education, and School Age Care, 2000" Children's Defense Fund, http://www.childrensdefense.org/pdf/2000_state_dev.pdf

Blau, David M. (2000). "Child Care Subsidy Programs," NBER Working Paper 7806, forthcoming in an NBER volume edited by Robert Moffitt.

Bloom, Dan, Mary Farrell, James J. Kemple, and Nandita Verma (1999). "The Family Transition Program: Implementation and Three-Year Impacts of Florida's Initial Time-Limited Welfare Program," New York: Manpower Demonstration Research Corporation, April.

Bos, Johannes M., Aletha C. Huston, Robert C. Granger, Greg J. Duncan, Thomas W. Brock, and Vonnie C. McCloyd (1999). "New Hope for People With Low Incomes: Two-Year Results of a program to Reduce Poverty and Reform Welfare," New York: Manpower Demonstration Research Corporation, August.

Carroll, Judith (2001). "How to Pay for Child Care? Local Innovations Help Working Families," PACE Policy Brief, http://pace.berkeley.edu/POLICY_BRIEF.01-1.pdf.

Committee on Ways and Means, U.S. House of Representatives (1998). "1998 Green Book," Washington D.C., May.

Fuller, Bruce, Sharon L. Kagan, Jan McCarthy, Gretchen Caspary, Darren Lubotsky, and Laura Gascue (1999). "Who Selects Formal Child Care? The Role of Subsidies as Low-Income Mothers Negotiate Welfare Reform," presented at the Society for Research in Child Development Meeting, Albuquerque NM, April.

Gelbach, Jonah (1999). "How Large an Effect Do Child Care Costs Have on Single Mothers' Labor Supply? Evidence Using Access to Free Public Schooling," Working Paper, Department of Economics, University of Maryland, College Park, December.

Hamilton, Gayle, Thomas Brock, Mary Farrell, Daniel Friedlander, and Kristen Harknett (1997). "The National Evaluation of Welfare-to-Work Strategies. Evaluating Two Welfare-to-Work Approaches: Two-Year Findings on the Labor Force Attachment and Human Capital Development Programs in Three Sites," New York: Manpower Demonstration Research Corporation, December.

Hamilton, Gayle, Stephen Freedman, and Sharon McGroder (2000). "The National Evaluation of Welfare-to-Work Strategies. Do Mandatory Welfare-to-Work Programs Affect the Well-Being of Children?" New York: Manpower Demonstration Research Corporation, June.

Jacobson, Linda (2000). "Are Child Care Options Expanding?" PACE Policy Brief, 1 (1), Summer. http://pace.berkeley.edu.

Kisker, Ellen E., Anu Rangarajan, and Kimberly Boller (1998). "Moving Into Adulthood: Were the Impacts of Mandatory Programs for Welfare-Dependent Teenage Parents Sustained After the Programs Ended?," Princeton NJ: Mathematica Policy Research, February.

Layzer, Jean, and Ann Collins (2000). "National Study of Child Care for Low-Income Families, State and Community Substudy, Interim Report, Executive Summary," Abt Associates, November, www.abtassoc.com.

Lemke, Robert J., Ann Dryden Witte, Magaly Queralt, and Robert Witt (2000). "Child Care and the Welfare to Work Transition," National Bureau of Economic Research Working Paper 7583, Cambridge, MA, March.

Meyers, Marcia K., and Theresa Heintze (1999). "The Performance of the Child Care Subsidy System: Target Efficiency, Coverage Adequacy and Equity," *Social Service Review* 73 (1), March: 37-64.

Meyers, Marcia K., Theresa Heintze, and Douglas A. Wolf (2000). "Child Care Subsidies and the Employment of Welfare Recipients," Working Paper, School of Social Work, Columbia University, New York, August.

Miller, Cynthia, Virginia Knox, Patricia Auspos, Jo Anna Hunter-Means, and Alan Orenstein (1997). "Making Welfare Work and Work Pay: Implementation and 18-Month Impacts of the Minnesota Family Investment Program," New York: Manpower Demonstration Research Corporation, September.

Mitchell, Anne, Louise Stoney, and Harriet Dichter (1997) "Financing Child Care in the United States: An Illustrative Catalog of Current Strategies," Pew Charitable Foundations, http://nccic.org/pubs/financing-cc/index.html

Quint, Janet C., Johannes M. Bos, and Denise F. Polit (1997). "New Chance: Final Report on a Comprehensive Program for Young Mothers in Poverty and Their Children," New York: Manpower Demonstration Research Corporation, October.

Riccio, James, Daniel Friedlander, and Stephen Freedman (1994). "GAIN: Benefits, Costs, and Three-Year-Impacts of a Welfare-to-Work Program," New York: Manpower Demonstration Research Corporation, September.

Robins, Philip K. and Robert Spiegelman (1978). "An Econometric Model of the Demand for Child Care," *Economic Inquiry* 16, Jan.: 83-94.

Schumacher, Rachel, and Mark Greenberg (1999). "Child Care After Leaving Welfare: Early Evidence from State Studies," Center for Law and Social Policy, Washington D.C., October. http://www.clasp.org/pubs/childcare/.

Tekin, Erdal (2001). "An Analysis of Single Mothers' Child Care, Employment, and Welfare Choices," unpublished Ph.D. dissertation, University of North Carolina at Chapel Hill.

U.S. General Accounting Office (1998). "Welfare reform: States' Efforts to Expand Child Care Programs," Report GAO/HEHS-98-27, Washington D.C., January.

Table 1
Distribution of Employment, Work-Related Activities, Welfare, and Child Care Subsidies

	All	Receives a CC subsidy	No CC subsidy
Percent employed	67.9	70.3	67.6
Percent in school	4.9	12.8	4.0
Percent unemployed	6.1	5.7	6.2
Percent on welfare	21.9	35.2	20.4
Percent received a child care subsidy in the past	4.0	18.0	2.3
Percent received welfare in 1996	29.1	51.8	26.4
Sample size	3,653	484	3,269

	Percent receiving a CC subsidy	
All	10.5	
	Yes	No
Employed	10.9	9.7
In school	27.2	9.6
Unemployed	9.8	10.6
On welfare	16.9	8.7

Source: Tabulations from the 1997 NSAF.

Table 2: Descriptive Statistics

Variables	Mean (Std. Dev.)
Dependent Variables	
Subsidy	0.105 (0.31)
Work	0.679 (0.47)
In school	0.049 (0.22)
Unemployed	0.061 (0.24)
Welfare	0.219 (0.41)
Explanatory Variables	
Mother's age	31.99 (6.93)
Race[a]	
Black	0.32 (0.47)
White	0.65 (0.49)
Mother is in good health	0.93 (0.25)
Hispanic	0.15 (0.36)
Family Size	3.61 (1.45)
Non-wage Income (/1000)[b]	7.479 (1.400)
Mother's Education[c]	
12-15 years	0.73 (0.44)
16 + years	0.11 (0.32)
Presence of children[d]	
At least one child#5 present	0.33 (0.47)
At least one child between 6-12 present	0.45 (0.50)
Lagged dependent variables	
Welfare in the past	0.29 (0.45)
Child care assistance in the past	0.040 (0.20)
Number of observations	3,653

Source: Tabulations from the 1997 NSAF.

Note: Standard deviations are in parentheses

[a]Omitted category is other

[b]Nonwage income includes all family income during 1996 except the mother's earnings and income from means-tested programs.

[C]Omitted category is less than high school

[d]Omitted category is the presence of at least one child in each age category

Table 3: Determinants of Receipt of a Child Care Subsidy

	Without Lagged Variables	With Lagged Variables
Received welfare in 1996		.068 (.012)
Received a child care subsidy after leaving welfare		.310 (.026)
Age	-.017 (.007)	-.012 (.006)
Age squared/100	.020 (.010)	.016 (.009)
Black	.047 (.032)	.029 (.032)
White	.025 (.031)	.022 (.030)
Hispanic	-.015 (.017)	-.014 (.017)
Good health	-.014 (.020)	-.011 (.020)
Education 12-15	.035 (.015)	.033 (.015)
Education 16+	.037 (.021)	.043 (.021)
Nonwage Income/1000	-.0022 (.0004)	-.0015 (.0004)
Family Size	.004 (.004)	.003 (.004)
Children aged 0-5 only	-.033 (.015)	-.024 (.015)
Children aged 6-12 only	-.082 (.014)	-.065 (.014)
R^2 (n)	.14 (3,653)	.19 (3,653)

Note: County dummies are also included in the model. the F-statistic for a test of the hypothesis that the effects of the county dummies are jointly zero is 1.41, which rejects at better than 1 percent. Standard errors corrected for arbitrary forms of heteroscedasticity are in parentheses.

Table 4: Effects of Receiving a Child Care Subsidy

State Dummies Included	Lagged Dependent Variables Included	Employed	In School	Unem-ployed	On Welfare
OLS Estimates					
1. No	No	.052 (.024)	.081 (.018)	-.010 (.013)	.104 (.025)
2. Yes	No	.058 (.024)	.078 (.018)	-.006 (.013)	.079 (.025)
3. No	Yes	.108 (.024)	.071 (.017)	-.019 (.014)	-.004 (.021)
4. Yes	Yes	.107 (.024)	.080 (.018)	-.015 (.014)	-.014 (.021)
2SLS Estimates					
5. No	No	-.074 (.075)	.108 (.040)	-.037 (.037)	.390 (.069)
6. Yes	No	-.037 (.082)	.082 (.043)	.005 (.039)	.172 (.070)
7. No	Yes	.061 (.076)	.060 (.040)	-.052 (.037)	.144 (.056)
8. Yes	Yes	.046 (.082)	.053 (.042)	-.005 (.039)	.055 (.061)

Notes: The complete results for the models in row 1 are given in the Appendix Table. Identifying instruments in the 2SLS models are county dummies. Standard errors corrected for arbitrary forms of heteroscedasticity are in parentheses.

a. The lagged dependent variables are welfare participation in 1996, and receipt of a child care subsidy after leaving welfare since January 1995.

Table 5

Coefficient Estimates and Simulations from a Multinomial Logit Model of Employment, School Enrollment, Unemployment, and Welfare

Dependent Variable Category			Actual CC Subsidy		Predicted CC Subsidy	
Welfare	Work	School or unemploy-ment	Coefficient (s.e.) on child care subsidy	Simulated effect of receiving a child care subsidy	Coefficient (s.e.) on child care subsidy	Simulated effect of receiving a child care subsidy
1. Yes	Yes	No	---	.069	---	.183
2. No	Yes	No	-0.95 (.19)	-.015	-2.52 (.55)	-.293
3. Yes	No	Yes	-0.03 (.24)	.067	0.05 (.64)	.183
4. No	No	Yes	-0.99 (.30)	-.003	-3.70 (1.13)	-.053
5. Yes	No	No	-1.41 (.25)	-.043	-1.02 (.65)	-.068
6. No	No	No	-2.07 (.33)	-.075	-3.30 (.84)	-.088

Notes: The other regressors in the model are those shown in appendix Table A2. The simulations were computed by setting the child care subsidy variable to zero for all observations, computing the predicted probabilities, and averaging over the sample. This was repeated with the subsidy variable set to one for all observations. The figures reported are the change in the probabilities as the subsidy variable changes from zero to one.

Table A1: Discrete Alternatives in the Theoretical Model

Alter-native	Empl-oyed	Work-related activity	Child care	Welfare	Child care subsidy	Choice variables
1			none			h = I = H = W = s = 0
2	yes		informal			I=h>0, *a*=H=W=s=0
3	yes		formal			H=h>0, *a*=I=W=s=0
4		yes	informal			I=*a*>0, h=H=W=s=0
5		yes	formal			H=*a*>0, h=I=W= s=0
6	yes		formal		yes	H=h>0, *a*=I=W=0, s=1; Y + hw #E_s
7		yes	formal		yes	H=*a*>0, h=I=W=0, s=1;Y + hw # E_s
8			none	yes		h = I = H = s =0, W=1; Y + hw # E_W
9	yes		informal	yes		I=h>0, *a*=H=s=0, W=1; Y+ hw # E_W
10	yes		formal	yes		H=h>0, *a*=I=0, s=0, W=1; Y + hw # E_W
11		yes	informal	yes		I=*a*>0, h=H=s=0, W=1; Y + hw # E_W
12		yes	formal	yes		H=*a*>0, h=I=0, s=0, W=1; Y + hw # E_W
13	yes		formal	yes	yes	H=h>0, *a*=I=0, s=W=1; Y + hw #E_W
14		yes	formal	yes	yes	H=*a*>0, h=I=0, s=W=1; Y + hw # E_W

Note: See the Appendix text for a description of the model.

Table A2: Full Results from OLS Estimates of the Outcome Equations

Outcome:	Employed	In School	Unemployed	On Welfare
Age	.033 (.010)	-.012 (.005)	-.004 (.005)	-.037 (.008)
Age squared/100	-.041 (.014)	.013 (.007)	.005 (.008)	.043 (.012)
Black	.053 (.048)	-.035 (.027)	.057 (.020)	-.042 (.045)
White	.075 (.047)	-.034 (.027)	.013 (.019)	-.088 (.044)
Hispanic	-.098 (.023)	-.001 (.010)	.021 (.013)	.038 (.021)
Good health	.080 (.032)	.005 (.013)	-.017 (.019)	-.006 (.029)
Educ 12-15	.248 (.023)	.030 (.009)	-.044 (.014)	-.112 (.021)
Educ 16+	.306 (.030)	.023 (.012)	-.048 (.017)	-.142 (.026)
Family size	-.033 (.006)	.004 (.003)	.011 (.004)	.040 (.006)
Nonwage income/1000	.0021 (.0006)	-.0001 (.0003)	-.0010 (.0003)	-.0058 (.005)
Children aged 0-5 only	.014 (.023)	.016 (.011)	.012 (.013)	-.043 (.021)
Children aged 6-12 only	.083 (.021)	.020 (.010)	-.002 (.012)	-.042 (.019)
CC subsidy	.052 (.024)	.081 (.018)	-.010 (.013)	.104 (.025)
Intercept	-.203 (.170)	.249 (.091)	.135 (.093)	1.046(.151)
R^2	.11	.03	.03	.12

Notes: Sample size is 3,653. The estimates correspond to those in row 1 of Table 4.

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