

The Incentives of Government Programs and the Well-Being of Families

Edited by Bruce Meyer and Greg Duncan

Joint Center for Poverty Research

JCPR

The Determinants and Consequences of Child Care Subsidy Receipt by Low-Income Families

David Blau and Erdal Tekin



The Determinants and Consequences of Child Care Subsidy Receipt by Low-Income Families

David Blau and Erdal Tekin
Department of Economics
University of North Carolina, Chapel Hill
January 2001

Revised version of a paper presented at the conference on Incentive Effects of Tax and Transfer Policies, December 8, 2000, Washington D.C. Thanks to Philip Levine for helpful comments and the Joint Center for Poverty Research for support. Comments welcome at david_blau@unc.edu.

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 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 paper has two objectives. First, we review the literature on subsidies and discuss their potential for helping low-income families become economically self-sufficient. Previous studies of child care subsidies use data from the pre-welfare-reform period, and we discuss the potential difficulties in applying those findings to the very different post-reform environment. We discuss some important issues that arise in designing a child care subsidy: restrictions on the types of child care that can be subsidized; the “crowding out” of private child care expenditures and informal unpaid child care; eligibility for a subsidy; and co-payment and sliding-scale fee structures.

The second objective is to use new household survey data from the early post-reform period to analyze the determinants of subsidy receipt and the effects of subsidy receipt on employment and welfare participation. We use data 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. An advantage of household survey data over administrative data is that information is available on both subsidy recipients and nonrecipients. Determinants of receipt can therefore be analyzed, and the employment outcomes of recipients and nonrecipients can be compared. The survey also includes much more detailed information on outcomes of interest than is usually available in administrative data. The NSAF includes a large number of current and former welfare recipients and other low-income families, providing a basis for reliable inference for the target population of welfare reform. State of residence is identified in the NSAF, and therefore we are able merge information on the characteristics and rules of state welfare and child care subsidy programs with the household data.

We use the data to address two questions. First, how do household characteristics and state subsidy rules and expenditure 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 and welfare participation? In this part of the analysis, we attempt to account for the likelihood that unobserved determinants of receiving a subsidy are correlated with unobserved determinants of the outcomes of interest. The results of the analysis will be useful to policymakers and researchers in understanding the potential contribution of child care subsidies to achieving welfare reform goals.

The paper proceeds as such: we first describe the current structure of child care subsidy programs in the United States and summarize information on expenditures and the number of recipients. We then discuss the factors that determine the work incentives provided by child care subsidies and how these incentives are affected by program design. In this section, we also discuss the determinants of subsidy take-up by eligible families. We then review the existing evidence on the effects of child care subsidies. The “Data” sections presents descriptive information on child care subsidies, employment, and welfare participation from the NSAF, followed by a section in which we present the models we estimate. We end with the results of the empirical analysis of subsidy receipt and effects and a short conclusion.

Child Care Subsidy Programs

The programs considered here provide subsidies for work-related child care expenses of children in low-income families. 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 the incentives are clearly different from those of programs explicitly designed to encourage labor force participation.¹

The history, goals, and main provisions of the major means-tested child care subsidy programs are summarized in Table 1.² The 1988 Family Support Act mandated two new programs, Aid to Families with Dependent Children Child Care (AFDC-CC) and Transitional Child Care (TCC). The AFDC-CC subsidy was intended to facilitate participation among welfare recipients in the Job Opportunities and Basic Skills (JOBS) program, an employment and training program mandated by the Family Support Act (FSA) to move families off welfare to economic self-sufficiency. The goal of the TCC program was to help maintain employment by providing subsidies to families 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 that might otherwise have been unable to work and

¹ See Blau (2000) for a discussion of the work incentives of early education programs.

² The Dependent Care Tax Credit (DCTC) has a subsidy rate that declines with the level of income, so this program is means-tested in a sense, though the subsidy rate remains constant for Adjusted Gross Income (AGI) above \$28,000. More importantly, however, because the credit is not refundable the amount of credit available to low-income families is relatively small. A non-refundable credit is limited to the amount of income tax liability; many low-income families have no federal income tax liability and therefore cannot receive any tax credit. Data from the Internal Revenue Service indicate that one quarter of the total amount of tax credit claimed in 1997 went to families with AGI of less than \$30,000, but almost all of this amount was claimed by families with AGI between \$15,000 and \$30,000; only 1.8 percent of the total was claimed by families with AGI less than \$15,000. See Statistics of Income Bulletin, Winter 1998/1999, http://www.irs.ustreas.gov/prod/tax_stats/soi/soi_bul.html. Some smaller programs omitted from the table are listed in U.S. General Accounting Office (1994a) and Robins (1991).

Table 1:
Summary of the History, Goals, and Provisions of Major Federal Means-Tested Child Care and Early Education Programs

Program	Aid to Families with Dependent Children Child Care	Transitional Child Care	At-Risk Child Care	Child Care & Development Block Grant	Title XX Social Services Block Grant
Acronym	AFDC-CC	TCC	ARCC	CCDBG	TXX-CC
Year Began	1988 ^a	1988	1990	1990	1975 ^b
Goal	Facilitate participation in the JOBS program	Help families that recently left AFDC for work maintain self-sufficiency	Help families that need child care in order to work and are at-risk of going on AFDC, if child care is not provided.	Provide child care services for low-income families, and improve the overall supply and quality of child care.	Help low-income families achieve self-sufficiency; prevent child neglect.
Original Form	Open-ended entitlement. Vouchers, contracts, or reimbursement of expenses. No fee for recipients	Same as AFDC-CC; limited to 1 year. Sliding fee for recipients.	Capped entitlement. State match required. Sliding fee for recipients. Income limits set by states.	Block grant to states. No state match. 75% for direct subsidies (income < 75% of SMI); 25% for quality improvement and consumer education.	Capped entitlement; population-based distribution to states
Major Changes	1996: PRWORA consolidated AFDC-CC, TCC, ARCC, and CCDBG into a single program: the Child Care and Development Fund (CCDF).				
Current Form	Combination discretionary and entitlement block grant. States must meet maintenance of effort and matching requirements for some of the entitlement funds. States may transfer up to 30% of their TANF block grant funds into the CCDF. States may also use TANF funds directly for child care, without transferring them to CCDF.				
Current provisions	Sliding fee scale, but states may waive fees for families below the poverty line. At least 4% of funds must be spent on quality-improvement and consumer education. Child care must meet state licensing and regulatory standards. Contracts or vouchers. Relative care eligible if provider lives in a separate residence.				
Current Eligibility Criteria	Family income no more than 85% of SMI, but states can (and most do) impose a lower income eligibility limit. Children < 13. Parents must be in work-related activities.				
Notes:					
a. Before explicit child care subsidies were added to the AFDC program in 1988, states could choose to disregard from earnings up to \$200/month in child care expenses incurred by employed AFDC recipients in determining AFDC eligibility and benefit amounts.					
Source:					
Committee on Ways and Means (1998, 2000) and U.S. Department of Education (http://www.ed.gov/legislation/ESEA/Title_II/preschool.html).					
b. Earlier provisions of the Social Security Act provided federal matching funds to the states for social services.					

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.

The proliferation of programs with different target populations, eligibility requirements, and subsidy rates following passage of FSA and OBRA resulted in a fragmented child care subsidy system. Families were forced to switch from one program to another as a result of changes in employment and welfare status, and some families would be ineligible for any subsidy despite their similar economic circumstances to eligible families. 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).³ The main goal of the consolidated program is to facilitate the transition from welfare to work and help maintain employment of low-income parents. A minimum of four percent of funds must be used by states for quality-improvement and consumer education activities. Federal CCDF funds are provided to 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). Under the new system, states can (but are not required to) allow a family that moves from welfare to work to continue receiving a child care subsidy without changing programs.

States can use CCDF funds to assist families with income up to 85 percent of State Median Income (SMI) 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 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 to serve families on welfare, families in work activities that 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 substantial portion of the discretionary funds and the other 30 percent of mandatory and matching funds be used to assist working poor families that 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 they can also use TANF funds directly for child care services without transferring the funds to CCDF. States

³ Three of the previous programs (AFDC-CC, TCC, and ARCC) were authorized and funded by Social Security Title IV-A. They were replaced by the Temporary Assistance for Needy Families (TANF) Child Care Block Grant, funded by the Social Security Act. PRWORA also reauthorized and revised the existing CCDBG program with its own funding. Finally, it stipulated that both the new TANF Child Care Block Grant and the CCDBG be administered by the CCDBG program. The combined program is called the CCDF, and it consists of the two separately authorized funding streams, administered jointly and subject to the same rules (Pitegoff and Bream, 1997). Many documents continue to refer to the joint program as the CCDGB, but the correct name of the combined program is now the CCDF. Most of the information on the CCDF provided here is from the Final Rule issued by U.S. Department of Health and Human Services in the Federal Register (July 24, 1998, pp. 39935-98; <http://www.acf.dhhs.gov/programs/ccb/policy/fr072498.pdf>)

must use “certificates” (formerly called vouchers) that allow families to purchase care from any provider that meets state regulations and licensing standards or that is legally exempt from licensing, including relatives and babysitters. The regulations that govern health, safety, group size, training, and so forth are determined entirely at the state level with no federal requirements, and vary widely across states.⁴ States are permitted to impose more stringent requirements for child care services funded by the CCDF, but any such additional requirements must be consistent with the strong provisions of the CCDF that require flexibility in parental choice of child care (see the Final Rule, *Federal Register*, July 24, 1998, p. 39986). States can also contract to purchase slots in day care centers and family day care homes and provide such slots to eligible families.

The other main child care subsidy program with an employment focus is the Title XX Social Services Block Grant (TXX). This program 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 have been spent on child care in recent years (Committee on Ways and Means, 1998, p. 720). Child care funded by Title XX must meet applicable state standards and is often provided through “slots” in centers and family day care homes purchased through grants and contracts with state or local agencies.

Table 2 summarizes federal and state expenditures on child care subsidies in recent years and the numbers of children served by the subsidy programs. The most recent data indicate that about \$5 billion in federal and state funds were spent by the CCDF, and another \$4 billion were transferred to the CCDF from TANF or spent directly by TANF on child care. Adding the .285 billion from TXX results in a total of approximately \$9.4 billion dollars per year in expenditures on child care by means-tested programs with a work requirement. The number of children served in recent years was 1.53 to 1.76 million. However, the implied level of funding per child of around \$5,100 per year (\$9.1 billion/ 1.76 million children in FY99) seems generally consistent with data on the reimbursement rates shown below.

States have substantial flexibility in designing their CCDF programs, including the income eligibility limit, co-payments by families, and reimbursement rates to providers. These rules are summarized for each state in Table 3. Only nine states set income eligibility at the maximum allowed by law, 85 percent of SMI. Seven states set the income eligibility limit at less than 50 percent of SMI. 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. The reimbursement rates listed in the last column represent the amount of the subsidy exclusive of the family co-payment. Federal guidelines for implementing the CCDF law require that the subsidy rate be set at the 75th 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 75th percentile of the price distribution (Adams, Schulman, and Ebb, 1998, p. 23).

⁴ See <http://ericps.ed.uiuc.edu/nccic/statepro.html> for information on state child care regulations.

Table 2:
Federal and State Expenditures and Children Served
by Major Means-Tested Child Care Subsidy Programs

	TXX-CC	CCDF
	Expenditure (billions)	
FY1999	.285 ^a	9.132 ^b
FY1998		6.399 ^b
FY1997	.370 ^d	4.369 ^b
FY1996	.352 ^d	3.125 ^c
FY1995	.414 ^d	3.017 ^c
	Children Served (millions)	
FY1999		1.760 ^e
FY1998		1.531 ^e
FY1997		1.248 ^f
FY1996		
FY1995		1.445 ^g

Notes:

See Table 1 for definition of the program acronyms. Expenditures are given in current dollars to facilitate checking with the original sources. To convert expenditures to constant 1999 dollars using the Consumer Price Index, multiply dollar figures for 1995, 1996, 1997, and 1998 by 1.093, 1.062, 1.038, and 1.022, respectively.

Sources:

- a. <http://www.cbpp.org/9-13-99bud.htm>: 15 percent of 1.9 billion for TXX.
- b. Computed by summing all federal and state expenditures on the CCDF, either directly or through transfers to TANF, using data from the Annual TANF Reports to Congress (<http://www.acf.dhhs.gov/programs/opre/director.htm>) and reports from the Child Care Bureau (<http://www.acf.dhhs.gov/programs/ccb/policy1/staillist.htm>).
- c. Committee on Ways and Means (2000), p. 621.
- d. Committee on Ways and Means (1998, p. 714, 720): 14.8 percent of total TXX funding of 2.800, 2.381, 2.500 for FY95, 96, 97.
- e. <http://www.acf.dhhs.gov/news/ccstudy.htm>
- f. Committee on Ways and Means (1998, p. 687).
- g. <http://www.acf.dhhs.gov/programs/ccb/data/1995.htm>. Sum of AFDC, TCC, ARCC, and CCDBG.

Table 3:
Characteristics of State Child Care and Development Fund Plans

State	Annual Income Eligibility Level	Income Eligibility as a percent of SMI	Proportion of eligible children served	Monthly income at which maximum fee is required	Fee waived for Families below Poverty Line	Minimum Fee (full-time rate)	Maximum Family Fee (full-time rate)	Reimbursement Rate for Infant-Toddler Age Children	Total Federal and state expenditure per eligible child, FY 1997
Alabama	\$17,328	49%	.09	\$1,858	Some	\$5.00 /week	\$72.50 /week	\$82/week	444
Alaska	\$38,244	85%	.11	\$3,187	Some	3% of cost	75% of cost	\$583/month	248
Arizona	\$18,000	48%	.12	\$1,500	Some	\$.50 /day	\$3.00 /day	\$19.80/day	384
Arkansas	\$18,401	60%	.05	\$1,533	All	No fee	80% of fee	\$16/day	174
California	\$30,036	75%	.06	\$2,149	All	\$2.00 /day	\$10.00 /day	\$185/week	336
Colorado	\$24,648	58%	.09	\$2,000	Some	\$176 /month	\$200 /month	\$20.43-23.13/ day	305
Connecticut	\$39,168	75%	.06	\$3,263	Some	No fee	\$326.3 /month	\$160/week	1091
D.C.	\$35,580	85%	.12	\$1,827	None	\$7/week	70% of fee	\$90.75/week	687
Delaware	\$20,124	56%	.12	\$1,677	All	1% of cost	46% of cost	\$21.10/day	966
Florida	\$24,084		.07	\$2,001	None	\$.80 /day	\$9.60 /day	\$115/week	412
Georgia	\$24,276	64%	.10	\$2,023	Some	\$5/week + \$3/extra kid	\$40/week + \$20/extra kid	\$85/week	396
Hawaii	\$34,488	75%	.08	\$2,874	All	0% of cost up to \$350	20% of cost up to \$280	\$350/month	241
Idaho	\$19,476	66%	.10	\$1,623	Some	2% of cost	90% of cost	\$400/month	167
Illinois	\$21,816	50%	.13	\$1,818	None	\$2.00 /week	\$55 /week	\$31.99/day	692
Indiana	\$25,332	64%	.04	\$2,056	All	\$0 /day	\$10.00 /day	\$42.25/day	393
Iowa	\$20,664	52%	.06	\$2,025	All	\$0	\$6/half-day	\$11.50/ half-day	335
Kansas	\$25,404	66%	.06	\$2,055	Some	\$24	\$223 /month	\$2.51/hour	214
Kentucky	\$17,724	56%	.15	\$1,477	Some	\$0	\$8/day + .75/ day for >1 kid	\$16/day	554
Louisiana	\$29,580	85%	.16	\$2,465	All	0	70% of cost	\$13/day	117
Maine	\$32,492	85%	.10	\$2,708	Some	2% of gross income	10% of gross income	\$128/week	296
Maryland	\$22,440	46%	.08	\$1,534	Some	\$3.00	\$209	\$711/month	1028
Massachusetts	\$33,252	67%	.15	\$2,771	Some	\$1.00 /week	\$114 /week	\$43/day	2615
Michigan	\$26,064	59%	.17	\$2,172	Some	5% of max rate	70% of max rate	\$2.95/hour	643
Minnesota	\$34,272	75%	.09	\$2,856	Some	\$22 /month	\$491 /month	\$125/week	272
Mississippi	\$21,996	85%	.04	\$1,833	Some	\$10.00 / month	\$153/month + \$5/month/ extra kid	\$77/week	70
Missouri	\$17,784	42%	.14	\$1,482	Some	\$1per year	\$4.00 /day	\$17.50/day	593
Montana	\$24,660	75%	.09	\$2,055	Some	\$5	\$308/ 15% co-pay	\$16/day	161
Nebraska	\$23,292	66%	.08	\$1,333	All	\$12 /month (two kids)	\$334 /month (two kids)	\$22.50/day	361
Nevada	\$31,536	75%	.05	\$2,628	Some	10% of cost of care	85% of cost of care	\$5/hour	134
New Hampshire	\$21,408	49%	.09	\$1,889	Some	\$0	\$.50/week per child + 34% of daily cost of care	\$18/day	760

Table 3: Continued
Characteristics of State Child Care and Development Fund Plans

State	Annual Income Eligibility Level	Income Eligibility as a percent of SMI	Proportion of eligible children served	Monthly income at which maximum fee is required	Fee waived for Families below Poverty Line	Minimum Fee (full-time rate)	Maximum Family Fee (full-time rate)	Reimbursement Rate for Infant-Toddler Age Children	Total Federal and state expenditure per eligible child, FY 1997
New Jersey	\$26,660	52%	.09	\$2,777	None	\$9.10 / month	\$294.90 / month	\$123.40/ week	508
New Mexico	\$23,412	75%	.12	\$2,278	Some	\$0	\$116 plus 19% of income over \$1,150	\$18/day	168
New York	\$26,964	65%	.18	\$2,247	Some	\$26/week	\$91/week	\$43/day	575
North Carolina	\$28,092	75%	.18	\$2,341	Some	9% of cost of care	9% of cost of care	\$368/month	394
North Dakota	\$29,340	85%	.11	\$2,445	Some	10% of cost of care	10% of cost of care	\$2.15/hour	106
Ohio	\$20,004	51%	.10	\$2,055	Some	\$15	10% of family's adjusted monthly income	\$105.00/ week	837
Oklahoma	\$27,696	85%	.21	\$1,500	Some	\$2.00 / month	\$201 /month	\$303/month	359
Oregon	\$33,012	85%	.08	\$2,087	Some	\$25	\$632	\$495/month	234
Pennsylvania	\$31,320	74%	.14	\$2,610	Some	\$5.00	\$65	\$29/day	393
Rhode Island	\$24,660	58%	.15	\$2,055	Some	\$5/week	\$23/week	\$98/week	819
South Carolina	\$16,224	44%	.09	\$1,893	None	\$11 /week	\$11 /week	\$67/week	257
South Dakota	\$20,004	56%	.08	\$2,055	All	5% of cost of care	85% of cost of care	\$1.80/hour	230
Tennessee	\$19,464	55%	.16	\$2,111	Some	\$5 to \$9 (for two children)	\$32 to \$56 (for two children)	\$72/week	560
Texas	\$27,480	75%	.07	\$3,000	Some	\$27 to \$33 (for two children) /month	\$270 to \$330 (for two children) /month	\$22.53/day	179
Utah	\$21,108	56%	.10	\$1,759	Some	\$10 to \$15 (for two children)	\$255 to \$281 (for two children)	\$18/day	588
Vermont	\$25,920	80%	.14	\$2,160	All	1% of the cost of care	40% of cost of care	\$18.84/day	946
Virginia	\$22,668	54%	.07	\$1,889	Some	10-12% of gross income (two or more children)	10-12% of gross income (two or more children)	\$177/week	441
Washington	\$23,328	56%	.13	\$1,944	None	\$10.00	\$392	\$31.82/day	655
West Virginia	\$18,744	75%	.24	\$1,562	Some	\$.15 /day	\$8.00 /day	\$13/day	615
Wisconsin	\$21,996	53%	.07	\$2,348	None	\$9.00 /week	\$91 /week	\$5.34/hour	530
Wyoming	\$17,736	42%	.10	\$1,334	None	\$.05 per hour per child	\$.50 per hour per child	\$2.50/hour	553

Note:

Florida computes eligibility as a percent of the poverty level rather than state median income.

Source:

<http://www.acf.dhhs.gov/programs/ccb/programs/plan/index.htm>. Figures in the last column were computed from expenditure data in the First Annual TANF Report to Congress (<http://www.acf.dhhs.gov/programs/opre/director.htm>) and reports from the Child Care Bureau (<http://www.acf.dhhs.gov/programs/ccb/policy1.statlist.htm>). Number of eligible children for the last column and proportion of eligible children served are from <http://www.acf.dhhs.gov/news/ccreport.htm>.

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). 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, by state, of child care subsidy receipt by families that 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.

Conceptual Issues

This section discusses the work incentives induced by child care subsidy programs. The main issues are (1) How does the availability of informal (unpaid) child care affect the work incentives of a child care subsidy? (2) How effective are child care subsidies compared with employment subsidies in achieving the goal of economic self-sufficiency? (3) To what extent do child care subsidies crowd out private child care expenditures by mothers who would have worked anyway? Before discussing these issues, it is worth considering the rationale for child care subsidies as a means of encouraging economic independence for low-income families.

Rationale for Work-Related Child Care Subsidies

Child care subsidies can help low-income families become economically self-sufficient. Self-sufficient in this context means employed and not enrolled in cash-assistance welfare programs. Self-sufficiency may be considered desirable for two reasons. First, it may be easier to gain public support for transfers to the poor if they are employed and the transfers are in-kind rather than in cash. Second, self-sufficiency today may increase future self-sufficiency by inculcating a work ethic and generating human capital, and it may therefore save the government money in the long run (Robins, 1991, p. 15). Child care and other in-kind subsidies paid to employed, low-income parents may cost the government more today than would cash assistance through TANF. However, if the dynamic suggested above is important, then these employment-related subsidies could result in increased future wages and hours worked and lower lifetime government assistance than the alternative of cash assistance both today and in the future.

There is surprisingly little known about wage growth of low-skill workers, but a recent paper by Gladden and Taber (2000) provides some useful evidence. They analyze wage growth of individuals with at most a high school education over the first ten years after completing school. Using longitudinal data from the National Longitudinal Survey of Youth, they find that wage growth rates as a function of labor market experience are very similar for different skill groups. They define skill groups by education (high school dropout versus graduate) and family background (parent's education and income). However, wage growth with experience is modest for all skill groups and does not seem high enough to lift low-skill workers out of poverty. High school dropouts averaged 4.4 percent wage growth per year of actual work experience over the first ten years of work. Thus, if a high school dropout began working at

the minimum wage of \$5.15, after ten years of work experience, his or her wage rate would have increased to \$8.00. This is not negligible, but it is also not enough to significantly reduce dependence on welfare. Gladden and Taber conclude from their results that “...low skill workers will not have huge wage gains from work experience. There is no reason to believe that forcing them to work will lead to a noticeable effect on the poverty rate.”

Work Incentives in Child Care Subsidy Programs

Most child care expenditures are made in order that a parent may work. A child care subsidy reduces this work-related expense and, therefore, increases the net return from employment. In economic terms, child care costs reduce the mother’s net wage rate. A higher price of child care increases the likelihood that the mother’s net market wage is below her reservation wage (the lowest wage for which she would be willing to work), thereby reducing the likelihood of employment. A child care subsidy raises the net wage, increasing the likelihood of work. The effect of a subsidy on hours of work conditional on employment, is theoretically indeterminate because the subsidy has a positive substitution effect and a negative income effect on hours of work. Most child care subsidies have a declining subsidy rate as income rises, and a maximum income level for eligibility. This does not affect the qualitative result that child care subsidies increase work incentives. It does affect the incentive to choose any particular level of work hours and could induce some mothers to reduce hours in order to qualify for a subsidy. Many parents have access to child care by relatives at no monetary cost. Subsidies will influence the tradeoff between paid and unpaid child care, and this may affect the magnitude of the work incentive of a child care subsidy. Restrictions on the quality of child care that can be used with the subsidy will also affect the work incentives of a subsidy. These issues are discussed below.

Unpaid child care.

Some families have access to care by a relative, including the father and other family members, at no monetary cost. Not all families with access to such care, however, use it because it has an opportunity cost. For example, the father or other relative sacrifices leisure or earnings in order to provide care. A child care subsidy reduces the effective price of market care but does not affect the price of unpaid relative care because no money changes hands for such care. A subsidy, therefore, increases the incentive to choose market child care. Thus, in addition to providing a work incentive for the mother, a subsidy also provides an incentive to use paid care conditional on the mother working. In the presence of an unpaid child care option, a subsidy will induce some women who would have worked anyway to increase use of paid care and reduce use of unpaid care in order to qualify for the subsidy. Thus, a subsidy for paid child care “crowds out” unpaid care. A child care subsidy will have income effects on all goods; therefore, the additional expenditure on child care by families that would have paid for care in the absence of a subsidy will be less than the amount of the subsidy. Private child care expenditures are crowded out.

Is a child care subsidy the most cost-effective way for the government to increase employment of low-income mothers of young children? An obvious alternative is a wage subsidy such as the Earned Income Tax Credit (EITC). Child care subsidies are available only if paid care is used, and some mothers will prefer to use unpaid care and pass up the subsidy. This could make a

child care subsidy more effective at increasing employment per subsidy dollar spent than a wage subsidy. On the other hand, a child care subsidy will induce some mothers who would have worked anyway to switch from unpaid to paid care, causing an increase in government expenditure with no resulting increase in employment. It turns out that for a wide range of plausible values of the parameters and variables, a child care subsidy that is a given proportion of the child care price generates many more additional hours worked per dollar of government expenditure than a wage subsidy that is the same proportion of the wage (See Blau, 2000, for details). This seems surprising because a wage subsidy appears to be a more direct instrument for increasing employment. However, a wage subsidy provides benefits to all working mothers, including those who use unpaid child care, while a child care subsidy provides no benefit to the latter group. It is the reluctance of many mothers to use paid care that makes a child care subsidy a more cost-effective method of increasing employment. If all working mothers used paid care then there would be no difference in the cost effectiveness of the two subsidies if they were set at the same proportional level.

Quality of child care.

If the quality of market child care varies, and if the quality of care affects child outcomes, then parents will be concerned about the quality of care they purchase. Most child care subsidies are independent of the quality of care. The CCDF can be used only in arrangements that satisfy state licensing standards or that are legally exempt from such standards. Such subsidies can be thought of as being subject to a quality threshold but independent of quality beyond the threshold. A subsidy that is independent of quality has a bigger work incentive than a subsidy that is restricted to high-quality child care. Therefore, if the goal of a subsidy program is to facilitate employment, this is best accomplished by the former type of subsidy.

Existing Evidence

This section describes evidence on the employment effects of means-tested child care subsidies. The evidence comes from three types of studies: evaluations of experimental demonstration projects, evaluations of actual child care subsidy programs, and studies of the effects of the price of child care. The latter type does not directly measure subsidies and their impact, but infers the impact of subsidies from the estimated price effects. This type of study is the least direct but by far the most common. The first three subsections focus on evidence pertaining to employment, and the fourth subsection discusses the much more limited evidence available on subsidy take-up.

Demonstrations

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 evaluated using randomized assignment methods; therefore, program effects are estimated without bias by simple comparisons of treatment and control group averages. However, in each case, the child care subsidy was only one of several services provided as part of the program; it is therefore impossible to determine how much of the program impacts were due to the child care subsidy. We discuss one example of a demonstration program to illustrate the nature of the evidence from such programs.

New Hope was a program intended to reduce poverty among the low-income population in Milwaukee (Bos et al., 1999). It operated from 1994 through 1998 with broad eligibility rules that made virtually anyone with low income eligible to enroll, regardless of employment and family status. The program was voluntary and provided an earnings supplement, affordable health insurance, child care subsidies, and a full-time community service job if no other employment was available. The program required full-time employment (30 hours per week) and provided benefits for up to three years. Participants made their own child care arrangements and were reimbursed for most of the expenses, with a co-payment that increased with family income. Just under 40 percent (39 percent) of participants with children used child care at an average subsidy of \$2,376 over two years. An early evaluation based on two years of data found that, among individuals who were not employed at entry to the program, participation in the program increased employment by 7 percentage points, boosted earnings by about \$700 per year (13 percent), raised income by 12 percent, and had no impact on welfare participation. The program had no statistically significant effects on employment and earnings for those who were employed for at least 30 hours per week at entry, although the sample size was small (the point estimate of the earnings impact was -\$571 per year). The program also reduced AFDC and Food Stamp participation by 7-10 percent in year two. The program increased use of formal child care by 7.4 percent for boys and 12.5 percent for girls, and resulted in improved academic performance, study skills, social competence, and behavior among boys but not girls.⁵

Actual Subsidy Programs

Three studies have estimated the impact of actual child care subsidies on employment. Two evaluate means-tested state subsidies for low-income families funded by federal programs prior to the 1996 welfare reform. The third evaluates the labor supply effects of the implicit child care subsidy provided by free public school. This is not a means-tested subsidy (and is not usually thought of as a child care subsidy at all), but information about its impact could be useful for evaluating the effects of means-tested child care subsidies with a similar structure. In each of these studies, the subsidy recipients are self-selected, and the studies recognize and attempt to deal with the possibility of selectivity bias.

Berger and Black (1992) evaluate the employment impact of two Kentucky child care subsidy programs funded by Title XX in 1989. Both programs subsidized slots in licensed day care centers only and imposed a work requirement of at least 20 hours per week. One program reimbursed day care centers directly for up to \$40 per week, depending on family income, and had an income eligibility limit of 60 percent of state median income; the corresponding figures for the other program were \$50 and 80 percent. The two programs are treated by Berger and

⁵ Other demonstrations and experiments that included child care subsidies were the Teenage Parent Demonstration (Kisker, Rangarajan, and Boller, 1998); New Chance (Quint, Bos, and Polit, 1997); GAIN in California (Riccio, Friedlander, and Freedman, 1994); the National Evaluation of Welfare-to-Work Strategies, formerly known as the JOBS program (Hamilton, Brock, Farrell, Friedlander, and Harknett, 1997; Hamilton, Freedman, and McGroder, 2000); the Minnesota Family Investment Program (Miller, Knox, Auspos, Hunter-Means, and Orenstein, 1997); the Florida Family Transition Program (Bloom, Farrell, Kemple, and Verma, 1999); and the Gary, Seattle, and Denver Income Maintenance Experiments. The GAIN demonstration excluded children under age 6. Granger and Cytron (1999) report that the effects of the Teenage Parent Demonstration and New Chance (which was also targeted at teenage mothers) on use of center-based child care were smaller than in New Hope and often statistically insignificant. Robins and Spiegelman (1978) estimate that eligibility for a SIME-DIME child care subsidy increased use of market child care by 18 percentage points in Seattle and 14 percentage points in Denver. Results for child care use in the other demonstrations are not available.

Black as a single program. The first evaluation strategy was to compare employment of single mothers who were subsidy recipients with employment of single mothers who were on the waiting list for a subsidy. A probit equation for employment was estimated on the combined sample of subsidy recipients and individuals on the waiting list, with a binary indicator of subsidy receipt the main regressor of interest. Evaluated at the means of other variables, the results indicate that the employment rate of mothers on the waiting list was 85.5 percent, and the employment rate of subsidy recipients was 97.5 percent, implying a (statistically significant) subsidy impact of 12 percentage points.

Berger and Black recognize that if program administrators select recipients based on characteristics not observed by the investigators, then the waiting list would not be a valid control group for the subsidy recipients. Their second evaluation strategy is to compare the employment of recipients before and after beginning to receive a subsidy. This yields an estimated subsidy impact of 8.4 percentage points. This estimate and the 12 percentage point estimate both are conditioned on applying for the subsidy program, which could be correlated with unobserved factors that affect employment. To deal with this, Berger and Black drew a sample of single mothers in Kentucky from the May 1988 Current Population Survey (CPS). They report that the employment rate in the CPS was 47.6 percent versus 88.6 percent in their combined sample of recipients and the waiting list group. The employment rate of the wait list group *before* entering the wait list was 22.6 percentage points higher than in the May CPS, other things being equal, indicating a large self-selection effect in applying to the program. The employment rate of the waiting list group was 16.9 percentage points higher after they applied to the program and entered the waiting list compared with before entering the wait list. Berger and Black suggest that this could be either a selection effect (i.e., their employment rate would have increased even if they had not applied to the program) or an impact of the subsidy; mothers go to work in anticipation of the work requirement when they are selected from the waiting list.

If the 16.9 percentage point increase in employment of the wait listed group after entering the waiting list is treated as part of the impact of the subsidy, then the full subsidy effect is $16.9 + 8.4$, or 25.3 percentage points, from an average weekly subsidy of \$45.62. Assuming this was a 100 percent subsidy, and assuming the employment rate among subsidy recipients is 97.5 percent, this implies an employment rate of 72.2 percent in the absence of the subsidy, yielding an employment effect of 35 percent and an elasticity of 0.35. If the 16.9 percentage point increase is treated as due entirely to selection effects, then the corresponding elasticity estimate is .094 ($8.4/(97.5-8.4)$). One caveat to generalizing from the study is that the subsidy was available only for use in day care centers, while most current programs provide vouchers that can be used in any paid arrangement. It is also unclear whether Kentucky is reasonably representative of the United States.

Meyers, Heintze, and Wolf (2000) use data from a sample of California AFDC recipients in four counties to analyze the determinants child care subsidy receipt and the impact of subsidy receipt on employment. Individuals were randomly selected from AFDC administrative records in November 1992, interviewed about 18 months later, and interviewed again 18 months after the first interview. By the time of the second interview, 25 percent were no longer receiving welfare. Those still receiving welfare were eligible for subsidies under a variety of different

programs, and assuming that the nonrecipients still had relatively low incomes, they were also likely to have been categorically eligible for a subsidy under various California programs. The authors use a subsample of 903 single mothers who responded to the second interview to estimate a probit model explaining whether the mother received a child care subsidy conditional on using nonparental child care. The predicted probability of subsidy receipt was computed from the estimated subsidy receipt probit for all mothers in the sample, and was used as a regressor in an employment probit. One exclusion restriction (the mother's knowledge of the rules of the child care subsidy system) was imposed on the employment probit to identify the effect of subsidy receipt. The predicted subsidy probability has a positive coefficient in the employment probit with a t-ratio of 2.3. Simulations indicate that as the probability of subsidy receipt increases from 0 to 0.5, the employment probability rises from .210 to .727 at the sample means of the other regressors. No information on the subsidy amounts or child care expenditures are provided; therefore, an elasticity cannot be computed.

A problem with drawing inferences from this study is that there is no natural control or comparison group available. The authors state, "The actual subsidy indicator S is observed only among mothers currently using child care, and therefore potentially able to have their child care expenses subsidized. The majority of mothers who are not employed ... do not use child care. Therefore we must anticipate selectivity bias among women for whom S is observed; that is, the unobserved factors associated with the receipt of a subsidy are likely to be correlated with the unobserved factors associated with the decision to be employed" (pp. 12-13). This is certainly true, but in the absence of a useful comparison group, such as a wait list group or the subsidy recipients before they received a subsidy, there is no reliable way to produce estimates that solve this problem.

Gelbach (1999) estimates the impact on employment of the implicit child care subsidy provided by free public kindergarten for five-year-old children. The structure of the subsidy is similar to Head Start: free child care of a given quality is provided for a fixed number of hours, and child care outside school hours must be purchased by the family or supplied by informal providers. Gelbach notes that mothers with stronger unobserved tastes for work will be more likely to enroll a child in school at the earliest possible age, making subsidy receipt endogenous. To identify the effect of the subsidy, Gelbach exploits variation in quarter of birth among the children and the fact that all states impose a date-of-birth requirement for entry to kindergarten. For example, if a child must reach his or her fifth birthday by December 31 in order to enter kindergarten in that year, a mother whose child was born in the fourth quarter of the year will have access to the subsidy for that school year while a mother whose child was born in the first quarter of the next calendar year will not, independent of labor supply preferences (assuming quarter of birth is exogenous). Gelbach uses quarter-of-birth dummies as instrumental variables for enrollment in public school. He uses data from the Public Use sample of the 1980 census (quarter of birth was not collected in the 1990 census) on 10,932 single mothers whose youngest child was age five at the time of the census on April 1, 1980.⁶ Gelbach's instrumental variable estimates indicate that access to free public school increased the employment probability by 5 percentage points at the interview date and by 4 percentage points during calendar year 1979. He also finds positive effects of about 2 on hours of work

⁶ Gelbach reports that his IV strategy performed poorly for single mothers with a five-year-old child and another child younger than five.

per week, 3.6 on weeks worked per year, \$932 on wage-salary income in 1979, and -.04 on the probability of receiving public assistance in 1979. All the estimates are statistically significant. Gelbach was unable to estimate the value of the subsidy; therefore, the elasticity of employment with respect to the subsidy could not be computed. Gelbach's approach is creative and provides credible evidence of the impact of a child care subsidy on employment of mothers whose youngest child is age 5. However, it is unclear whether his results can be generalized to children younger than age 5.⁷

A final point about these three studies is that the drastic nature of the 1996 welfare reforms may make these pre-reform results less relevant for predicting the effects of 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. Therefore, the results of studies prior to PRWORA will not necessarily be a good guide to behavior in the post-PRWORA era.

Inferences Based on Effects 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 is to infer how child care price subsidies would affect employment decisions. Whether inferences about the effects of subsidies drawn from this research are useful depends on several factors. First, if there are substantial costs to taking up a subsidy, either in the form of time 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 research are generally assumed to be linear, while most subsidies are nonlinear. As noted above, being nonlinear does not affect the qualitative result that a child care price subsidy will increase employment, but it could affect the magnitude of the employment effect. Thus, estimates of linear price effects could be an unreliable guide to the effects of typical nonlinear subsidies. Third, issues of specification and estimation of econometric models of price effects could affect the inferences drawn from such effects.

Table 4 summarizes results from studies on the price of child care and employment of mothers in the United States.⁸ Estimated price elasticities in these studies range from .06 to - 1.26. The studies differ in the data sources and in sample composition by marital status, age of children,

⁷ There is also the issue of whether results from a universal subsidy are a reliable guide to the effects of a means-tested subsidy. Thirty-four percent of Gelbach's sample of single mothers whose youngest child was five years old received public assistance in 1979, and average 1979 wage-salary earnings of workers were \$5,193. Thus, this is a relatively low-income sample that is likely to have been representative of mothers eligible for means-tested subsidies in 1980; therefore his results do seem useful for predicting the impact of a similarly structured means-tested subsidy.

⁸ Some studies are not included in the table because the elasticity of the probability of employment with respect to the price of child care was not estimated or reported. Some of the latter studies estimated an hours of work or a marginal rate of substitution equation instead of an employment equation (Averett, Peters, and Waldman, 1997; Heckman, 1974; Michalopoulos, Robins, and Garfinkel, 1992). Others did not report enough information to determine the method of estimation or the elasticity (Connelly, 1990; Kimmel, 1995). Michalopoulos and Robins (1999) use a pooled sample of Canadian and U.S. families, and Powell (1997) analyzes Canadian data. Michalopoulos and Robins report an elasticity of employment with respect to the price of child care of -.156, and Powell's estimated elasticity is -.38.

Table 4:
Summary of Studies of the Effect of the Price of Child Care on Employment of Mothers

Study	Data	Population	Employment	Price	Method	Elasticity
Anderson and Levine (2000)	SIPP 1990-93	child < 13	binary: LFP	total c.c. expenses per mother's hours worked	Probit; standard	Married, <13: -.30 Single, <13: -.47 Married, <6: -.46 Single, <6: -.58
Blau and Robins (1991)	NLSY 1982-86	child < 6	binary: employed in last 4 weeks	total c.c. expenses per hour of care	Probit; standard	.04*
Connelly and Kimmel (1999)	SIPP 1992-3	child < 6	Binary: LFPa	expenditure per hour on primary arrangement of youngest child	Probit; standarda	Married: -.160 Single: -.316
Connelly (1992)	SIPP 1984	Married, child<13	binary: LFP	total c.c. expenses per mother's hours worked	Probit; standard	-.20
U.S. GAO (1994b)	NCCS 1990	child<13	binary: LFP	total weekly c.c. expenses	Probit; standard	Poor: -.50 Near poor: -.34 Not poor: -.19
Han and Waldfogel (1999)	CPS 1991-94	child < 6	binary: employed	total c.c. expenses per mother's hours worked (from SIPP)	Probit; standard	Married: -.19 Single: -.41
Hotz and Kilburn (1994)	NLS72, 1986	child < 6	employed	total c.c. expenses per hour of care	probit	-1.26
Kimmel (1998)	SIPP 1987	child < 13	binary: worked last month	total c.c. expenses per mother's hours worked	Probit; standard	Married: -.92 Single: -.22
Ribar (1992)	SIPP 1984	child < 15	employed	total c.c. expenses per hour of care	probit	-.74
Blau and Hagy (1998)	NCCS 1990	child < 6	employed	quality-adjusted location-specific price from provider survey	Multinomial logit	-.20
Blau and Robins (1988)	EOPP 1980	married, child < 14	employed	average location-specific weekly c.c. expenditure	Multinomial logit	-.34
Fronstin and Wissoker (1995)	NCCS 1990	child < 6	employed	average location-specific price from c.c. provider survey	binary logit	Low-income area: -.45 High-income area: .06*
Ribar (1995)	SIPP 1984	married, child < 15	employed FT, employed PT	total c.c. expenses per hour of care	structural multinomial choice	Child<15: -.09 Child<6: -.09

Notes:

a. Connelly and Kimmel (1999) focus most of their analysis on an ordered probit model of non-employment, part-time employment, and full-time employment. An overall employment elasticity based on this model is not reported. An employment elasticity based on a standard employment probit is reported in the paper, and is the source of the estimates given in the last column above, but the estimates from the which the elasticity is computed are not given in the paper. SIPP = Survey of Income and Program Participation. NLSY = National Longitudinal Survey of Youth. NCCS = National Child Care Survey. CPS = Current Population Survey. NLS72 = National Longitudinal Survey of the Class of 1972. EOPP = Employment Opportunity Pilot Projects.

* Underlying coefficient estimate on the price of care was statistically insignificant at the 10% level.

and income. Sample composition does not explain much of the variation in the elasticity estimates; the range of estimates is large within studies using the same sample composition. Differences in the data sources also do not appear to account for much variation in the estimates. There is substantial variation in estimates from studies using the same source of data (e.g., Connelly, 1992; Ribar, 1992). Hence, specification and estimation issues most likely play an important role in the variation among estimates.

The nine studies listed in the upper panel of the table use very similar methods and are discussed as a group. These studies estimate a binomial discrete choice model of employment by probit. The price of child care is measured by the fitted value from a child care *expenditure* equation estimated by linear regression on the subsample of employed mothers who pay for care. The expenditure equation is corrected for selectivity on employment and paying for care using a first stage bivariate probit model of these outcomes, following Maddala (1983) and Tunali (1986). To avoid relying exclusively on functional form for identification, some variables that are included in the child care expenditure equation are excluded from the employment probit in which the fitted value from the expenditure equation appears as a regressor. Also, some variables that are included in the binomial probit selection equations are excluded from the child care price equation to help identify the selectivity effects.⁹

Two key problems with this approach are the implicit assumption that all nonparental child care has a monetary price, and the use of household expenditure to estimate price. A substantial share of all nonparental child care is unpaid, but this is not accounted for in the binomial employment model. This model assumes that all mothers behave as if a small increase in the price of child care will make work less attractive. In fact, however, many mothers are “infra-marginal” with respect to the price of child care: use of informal child care dominates use of paid care for a wide range of values of the price of paid care. Unpaid child care accounts for almost half of all child care used by families with an employed mother and a preschool age child (Blau, 2000). Specifying an employment model under the assumption that paid care is always the relevant nonmaternal child care option is thus a potentially serious error. The estimated relation between the price of child care and employment in this specification will be determined, in part, by the proportion of the population using unpaid care. If the price of child care changes, this proportion will change, and the estimated price effect would not be a valid guide to the employment impact of the price change. This is a version of the Lucas critique: a structural model could account for the fact that price affects behavior only by changing the utility associated with alternatives in which paid care is used, while a reduced form model cannot account for this.

If the unobserved factors that influence employment and child care behavior are correlated with the unobserved determinants of the price of child care, then estimating a model of household child care expenditures on a sample of mothers who are employed and pay for care yields biased estimates. Most researchers who use this approach have recognized the problem and, as noted above, have specified reduced form employment and pay-for-care equations that are used to correct the child care price equation for selection effects in a two-stage estimation.

⁹ Exceptions to this general approach among the nine studies include the following. Blau and Robins (1991) estimate the employment probit jointly with equations for the presence of a preschool age child and use of non-relative care. Ribar (1992) estimates the employment equation jointly with equations for hours of paid and unpaid care. Hotz and Kilburn (1994) estimate their binary employment equation jointly with equations for use and hours of paid child care, child care price, and the wage rate. The wage, price, and nonwage income variables are not adjusted for taxes, and subsidies in any of the studies listed in the table.

However, there are no theoretically justified exclusion restrictions to identify the selection effects: the price function is a reduced form, so it contains all of the exogenous variables in the model. Hence, the only basis for identifying a child care price equation using consumer expenditure data in a manner consistent with economic theory would be functional form or covariance restrictions. That is, assume that the unobserved factors that influence employment and child care behavior are uncorrelated with the unobserved determinants of the price of care.

The estimated elasticity of employment with respect to the price of child care ranges from .04 to -1.26 in the first nine studies listed in Table 4. Without a detailed examination of specification and estimation differences, it is difficult to explain why these estimates are so dispersed. It is possible that some of this variation is due to the two problems discussed here: treating paid child care as if it were the best option for all mothers, and inappropriate exclusion restrictions to identify the child care price equation. Different identification restrictions are used in each study, possibly leading to different degrees of bias. Different data sources containing different proportions of mothers who use paid care are used in each study, and the bias caused by treating paid child care as if it were the best option for all mothers is likely to depend on this proportion.

The studies listed in the lower part of the table attempt to avoid one or both of the problems described above. Ribar (1995) specifies a structural multinomial choice model with a quadratic utility function in consumption, hours of work, and hours of paid care. The discrete outcomes are full-time employment with unpaid care, full-time employment with paid care, part-time employment with unpaid care, part-time employment with paid care, and no employment. The standard approach of imposing arbitrary exclusion restrictions on reduced form employment and payment equations is used in order to identify the child care expenditure equation. However, paid child care is *not* treated as if it was the best option for all mothers: the price of child care influences behavior by affecting the utility of the two options in which paid care is used, consistent with economic theory.

Blau and Hagy (1998) specify a multinomial choice model with categories defined by cross-classifying binary indicators of employment and paying for care with a four-way classification of mode of care (center, family day care, other nonparental, and parent). As in Ribar (1995) the price of care affects behavior only by affecting the utility of outcomes involving paid care, so paid child care is not treated as if it was the best option for all mothers. The model is estimated by multinomial logit jointly with equations for hours of work, hours of child care, and several other continuous outcomes. A discrete random effects specification is used to account for the possibility of correlation in the disturbances across the discrete choices and between the disturbances in the discrete and continuous outcomes (Mroz, 1999).

The price of child care is derived from a survey of day care centers and licensed family providers, conducted in the same geographic locations as the survey of consumers. The only source of variation used to identify the price effect is geographic variation in the quality-adjusted price of care. The price of care charged by centers is adjusted by regression for characteristics of the centers associated with the quality of care, such as group size, child-staff ratio, teacher education and training, and curriculum. This approach avoids selection and identification problems inherent

in the use of consumer child care expenditure data to measure the price of care, and allows for observed differences across locations in quality. Fronstin and Wissoker's (1995) approach to measuring the price of child care is essentially a special case of this approach in which no adjustment for quality is made.

Blau and Robins (1988) estimate a multinomial choice model of employment and child care decisions by multinomial logit, but the price of child care was included in all of the outcomes in which the mother is employed instead of only those in which paid care is used. This is inconsistent with the theory described above and is equivalent to assuming that paid care is always the best option.

The studies that are most consistent with an underlying framework in which informal care is dealt with appropriately are Blau and Hagy (1998) and Ribar (1995). Both studies produce estimates of the elasticity of employment with respect to the price of child care at the lower end of the range (in absolute value): -.09 from Ribar and -.20 from Blau and Hagy. Blau and Hagy repeated their analysis using consumer expenditure data to measure the price of child care in place of the provider survey data, and estimated an elasticity of -.06 in this case. This could explain why Ribar's estimate is smaller than Blau and Hagy's; he used consumer expenditure data to measure price. It is risky to generalize from only two studies, but the fact that they accounted for informal care in ways consistent with economic theory and produced small elasticities suggests that the true elasticity may be small.¹⁰

The elasticity of employment with respect to the price of child care may differ across groups. Ribar (1995) uses a sample of married mothers and Blau and Hagy use a sample with married and single mothers, dominated by the former. If the elasticity of employment with respect to the price of child care is different for married and single mothers, then the evidence from these two studies would not be a good guide to price effects for single mothers. Kimmel's (1998) results indicate quite different elasticities for married and single mothers, but Anderson and Levine (2000) and Connelly and Kimmel (1999) produce estimates that are much closer for the two groups. If the elasticities differ substantially with the level of income, then estimates for random samples of the population, as in Blau and Hagy (1998) and Ribar (1995), could be misleading if applied to the low-income population. Estimates produced by Anderson and Levine (disaggregated by education of the mother; not shown in Table 4), Fronstin and Wissoker, and U.S. General Accounting Office (1994b) all show larger elasticities for low-income groups. This suggests that the true elasticity for low-income mothers could be substantially larger than the estimates from Blau and Hagy (1998) and Ribar (1995).

Evidence on Subsidy Take-up

Meyers and Heintze (1999) examine the use of child care subsidies in a sample of current and former welfare recipients in four counties of California 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

¹⁰ Preliminary results from a third study that appropriately deals with unpaid child care also show a small price elasticity of employment for a sample of single mothers (Tekin, 2000).

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 unaware 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 percent across all programs.

Fuller et al. (1999) estimate 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 nonmaternal child care, 37 percent to 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.

Data

The National Survey of America’s Families (NSAF) was conducted by the Urban Institute between February and November 1997.¹¹ It was designed to analyze the consequences of devolving 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.¹² Residents of 13 states¹³ were oversampled to allow detailed within-state analysis, and low-income households (income less than twice the federal poverty level) were oversampled as well. The full NSAF sample includes 44,461 households. We select a subsample 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. After excluding cases with missing data, we have a sample of 4,029 households.

The main variables of interest are child care subsidies, employment status, and welfare status. The respondent (typically the mother) was asked whether she receives any assistance paying for child care, including assistance from a welfare or social services agency, her employer, and a noncustodial 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 5 shows that 10.4 percent of our sample receives a subsidy by this measure. The Administration for Children and Families (1999) estimates that 15 percent of eligible families received a CCDF subsidy in 1998. 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.¹⁴ Therefore, a 10 percent subsidy coverage rate is not

¹¹. Another round of the NSAF was conducted in 1999, with a new sample. Data from the 1999 round have not yet been released to the public.

¹². 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.

¹³. Alabama, California, Colorado, Florida, Massachusetts, Michigan, Minnesota, Mississippi, New Jersey, New York, Texas, Washington, and Wisconsin.

¹⁴. The Urban Institute had not released the income data from the NSAF needed to compute eligibility in time for us to use them. These data were released in January 2001 and will be incorporated in a subsequent version of this paper. If a family receives a subsidy through a contract in which a social service agency purchases “slots” in day care centers and assigns them to eligible families, then it is possible that the family would not be aware of receiving a subsidy and would therefore not report a subsidy. This seems unlikely since most families are likely to be aware that child care is normally not free

Table 5:
Distribution of Employment, Work-Related Activities, Welfare, and Child Care Subsidies

	All	Receives a CC subsidy	No CC subsidy
Percent employed	68.1	70.3	67.8
Percent in school	4.9	12.7	4.0
Percent unemployed	5.9	5.5	6.0
Percent in work-related activity	78.9	88.5	77.8
Percent on welfare	21.5	34.7	20.0
Percent received a child care subsidy in the past	3.9	18.2	2.3
Percent received welfare in 1996	35.6	43.1	34.7
Sample size	4,029	419	3,610
Percent receiving a CC subsidy			
All	10.4		
	Yes	No	
Employed	10.7	9.6	
In school	26.9	9.5	
Unemployed	9.7	10.4	
Work-related	11.6	5.6	
On welfare	16.7	8.6	

Source: Tabulations from the National Survey of America's Families.

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, TANF, as of the survey date. The employment rate is 68.1 percent, and the welfare participation rate is 21.5 percent. The NSAF also contains measures of 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 receiving welfare. In some specifications of our models, we condition on these lagged dependent variables.

We expect that subsidy recipients would have a higher employment rate than nonrecipients given that most child care subsidies are conditioned on employment or employment-related activities, such as education, training, and job search. In fact, Table 5 shows that the employment rate is 70.3 percent among subsidy recipients and 67.8 percent among nonrecipients. 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 the 124 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.¹⁵ It is unclear why these women are receiving a child care subsidy. One possibility is that their children are in Head Start or some

¹⁵. The other reasons include ill or disabled, couldn't afford child care, transportation problem, and being in prison.

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. Only 8 percent of the mothers who receive a subsidy and are not employed, in school, or unemployed report using Head Start.

To examine the effects of child care subsidies on employment-related activities, we analyze several additional outcomes. These include a binary indicator for being enrolled in school, a binary indicator for being unemployed, and a binary indicator for being employed, in school, or unemployed, referred to as being in a work-related activity for brevity. As shown in Table 5, 4.9 percent of the sample was enrolled in school, 5.9 percent was unemployed, and 78.9 percent was in a work-related activity (employed, in school, or unemployed). We also explore the sensitivity of the results to alternative treatment of cases in which a child is enrolled in Head Start.

Subsidy recipients are much more likely to be on welfare than nonrecipients—34.7 percent versus 20 percent. This is consistent with the CCDF stipulation that priority for subsidies should be given to families on welfare, families in work activities that are leaving welfare, and families at risk of going on welfare. The lower panel of Table 5 shows that child care subsidy receipt is almost twice as common for families receiving welfare (16.7 percent) compared with families not receiving welfare (8.6 percent). However, the employment rate of mothers receiving welfare is only 25.9 percent compared with 79.7 for mothers not receiving welfare; therefore, it is unclear that subsidies targeted to welfare families are successful in encouraging employment. Of course, what we really would like to know is what the employment rate of welfare recipients would have been had the subsidy receipt rate in this group been lower.

We condition on a small set of characteristics of the mother and family, including her age, race, ethnicity, health status, education, presence of children by age, and region. Descriptive statistics for these variables are provided in Table 6. The state-level variables used in the analysis include the following characteristics of state CCDF programs: the income eligibility limit as a percent of state median income; the weekly reimbursement rate for an infant-toddler-age child; the monthly income level at which the family is required to pay the maximum fee; total federal plus state expenditure per eligible child served; and the percent of eligible children served. Data by state for these variables are shown in Table 3. Other state-level variables include median income; the female unemployment rate; the percentage of children under age 5 living in poverty; and three characteristics of state welfare programs: whether job search is required, the benefit reduction rate, and the income limit for eligibility.

Table 6:
Descriptive Statistics

Variables	Mean	(Std. Dev.)
Dependent Variables		
Subsidy	0.104	(0.30)
Work	0.681	(0.47)
In school	0.049	(0.20)
Unemployed	0.059	(0.24)
Work-related activity	0.789	(0.42)
Welfare	0.215	(0.41)
Explanatory Variables		
Mother's age	31.9	(6.9)
Race^a		
Black	0.32	(0.47)
White	0.65	(0.48)
Mother is in good health	0.93	(0.25)
Hispanic	0.14	(0.35)
Mother's Education^b		
12-15 years	0.73	(0.44)
16 + years	0.11	(0.32)
Region of Residence^c		
Northeast	0.23	(0.42)
West	0.17	(0.37)
South	0.31	(0.46)
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	0.039	(0.19)
State-level variables		
Unemployment rate for female workers (%)	5.19	(1.45)
Median income (/10000)	4.036	(0.65)
Percentage of children under age 5 living in poverty	21.9	(7.0)
Income eligibility limit for a child care subsidy (/median income)	63.9	(11.2)
Monthly income level at which maximum child care fee is charged (/1000)	2.289	(.386)
Weekly child care reimbursement rate for infant-toddlers (/100)	1.468	(0.51)
Job search required as a condition for welfare eligibility	0.32	(0.46)
Benefit reduction rate for welfare	0.54	(0.27)
Monthly income limit for welfare eligibility (/1000)	0.880	(0.37)
Number of observations	4,029	

Note: Standard errors are in parentheses

^aOmitted category is other

^bOmitted category is less than high school

^cOmitted category is midwest

^dOmitted category is the presence of at least one child in each age category

Model

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

(1)

$$S_i = X_i\beta + Z_{si}\gamma_s + \varepsilon_i$$

(2)

$$O_i = \alpha S_i + X_i\delta + Z_{oi}\gamma_o + \eta_i$$

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,

Z_s are vectors of policy variables and other characteristics of the state of residence of the family,

ε_i and η_i are disturbances, and

β the γ 's, α , and δ 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 child care subsidy system and the state economy (Z_s), and unobserved family and state characteristics (ε). However, child care subsidies are rationed because the program is a capped entitlement and is funded at a level too low to serve all eligible families. Thus, not all families that demand a child care subsidy receive one. Subsidies are allocated based on observed family characteristics (X), observed features of the state child care subsidy system and the state economy (Z_s), and unobserved family and state characteristics (ε). Thus (1) is a reduced form; we cannot distinguish the demand effects and supply effects of X and Z_s , only 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 think of α as the "causal effect" of receiving a subsidy on the outcome of interest. However, this is not a structural model in the sense that it has 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,¹⁶ and this is the

¹⁶ 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. However, as noted above, the income data needed to compute the subsidy amount were released just a short time ago. The number of children by age was also not released until recently. Also, a structural model would 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 nonpayers, respectively. See Tekin (2000) for an analysis that deals with these issues.

approach followed by previous studies of child care 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 α can be interpreted as the *ceteris paribus* effect of being assigned a subsidy *and* accepting it. This parameter is of interest for descriptive purposes 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. In that model, α depends on both preference parameters and the parameters of the mechanism used by administrators to assign subsidies.

The literature on child care subsidies emphasizes that ε_i and η_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. Unfortunately, there are no plausible identifying instruments available that could justifiably be included in (1) and excluded from (2). 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 could be included in Z_{si} but not in 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. And rules that determine the subsidy benefit affect the value of being employed and receiving a subsidy. Hence we cannot claim to produce consistent estimates of α , the parameter of interest. We present Ordinary Least Squares (OLS) estimates and Two-Stage Least Squares (2SLS) estimates with alternative sets of exclusion restrictions. The exclusion restrictions are not well-justified, but we present 2SLS estimates anyway for comparison purposes. The estimates of α are inconsistent unless it happens that ε_i and η_i are uncorrelated. Thus, our results are subject to the same criticism we made above of the Meyers, Heintze, and Wolf (2000) paper: there is no natural control or comparison group available. Also, the identifying instruments that we use are aggregate state-level variables, and these are likely to be relatively weak instruments for explaining individual-level subsidy receipt.

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.

Results

Table 7 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. Black women are more likely to receive a subsidy than white women and women of other races (other race is the reference group), and Hispanic mothers are slightly less likely to receive a subsidy than non-Hispanics, other things being equal. Mothers who have completed high school are about 3 percentage points more likely to receive a subsidy than high school dropouts. Mothers with a child ages birth to 5 but no child ages 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 ages 6-12 and no child birth to age 5 are 9 percentage points less likely to receive a subsidy than mothers with children in both age groups.

Table 7:
Determinants of Receipt of a Child Care Subsidy

	Without Lagged Variables	With Lagged Variables
Received welfare in 1996		.074 (.011)
Received a child care subsidy after leaving welfare		.329 (.024)
Age	-.013 (.006)	-.0093 (.0059)
Age squared	.000155 (.000090)	.000116 (.000087)
Black	.052 (.029)	.038 (.028)
White	.036 (.028)	.036 (.027)
Hispanic	-.022 (.015)	-.022 (.014)
Good health	-.021 (.019)	-.016 (.018)
Education 12-15	.025 (.013)	.027 (.013)
Education 16+	.034 (.019)	.044 (.019)
Children aged 0-5 only	-.035 (.014)	-.023 (.013)
Children aged 6-12 only	-.091 (.013)	-.069 (.013)
Northeast	-.028 (.020)	-.022 (.019)
West	.016 (.022)	.001 (.021)
South	-.038 (.024)	-.041 (.023)
CCDF weekly reimbursement rate	-.00010 (.00014)	-.00011 (.00014)
CCDF income eligibility/SMI	.00040 (.00066)	.00013 (.00064)
Monthly income at which family pays maximum fee/1000	.0044 (.0232)	.0021 (.0225)
Unemployment rate	-.0039 (.0064)	-.0031 (.0062)
State median income (SMI)/1000	.0028 (.0024)	.0030 (.0022)
Percentage of children <5 in poverty	-.00086 (.00180)	.00067 (.00174)
Intercept	.295 (.161)	.141 (.156)
R ² (n)	.04 (4,029)	.10 (4,029)

Note: Robust standard errors are in parentheses.

The state-level variables appear to have little or no impact individually or as a group. An F-test fails to reject the hypothesis that coefficients on the state-level variables are jointly zero. An alternative specification not shown in the table replaced the state-level variables with state

dummy variables. The hypothesis that the coefficients on the state dummies are jointly zero is strongly rejected. This means that subsidy receipt does vary significantly across states, but the state-level variables we use fail to explain this variation. In the second-stage results reported below, we compare estimates based on first-stage estimates using state dummies with the first-stage estimates reported in Table 7. We estimated two other specifications not reported in Table 7. First, we added a measure of total federal and state child care spending per eligible child. The coefficient estimate on this variable was small and insignificantly different from zero. Second, we added a measure of the proportion of eligible children served (from Administration for Children and Families, 1999). The coefficient estimate on this variable was .58 (standard error .17) and significantly different from zero. The estimate implies that each percentage point increase in the percentage of eligibles served is associated with a .58 percentage point increase in subsidy receipt in our sample. The estimate is less than one because not everyone in our sample is eligible for a subsidy. This variable seems to have some identifying power, but it is really just a state-level aggregate of the dependent variable, and as such is not an independent source of information. For example, if we ran the regressions reported in Table 7 using states as the unit of observation, the variable would differ from the dependent variable only because of eligibility differences across states, which are already captured by the other state-level regressors.

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 on exiting welfare. Welfare participation in the recent past is associated with a 7.4 percentage point increase in the likelihood of subsidy receipt. Past subsidy receipt is associated with a 33 percentage point increase in the likelihood of subsidy receipt. These results clearly indicate strong persistence over time in a link between subsidy receipt and welfare participation.

Table 8 presents estimates of the effect of receiving a child care subsidy on employment, employment-related activities, and welfare participation. Each row presents estimates of α in equation (2) from a different specification or estimated by a different method. The first row presents OLS estimates from a specification of equation (2) that does not include any state-level variables (except region dummies) or lagged dependent variables. The complete results from this model are provided in the Appendix. Receipt of a child care subsidy is associated with a 5 percentage point increase in the likelihood of employment, an 8 percentage point increase in the likelihood of attending school, and no impact on unemployment. The variable “work-related activities” is equal to 1 if the mother is employed, in school, or unemployed. These three activities are treated as mutually exclusive; therefore, the effect of receiving a child care subsidy on work-related activities is the sum of the three separate effects, or 13 percentage points, as shown in the fourth column. Receiving a child care subsidy is associated with a 10 percentage point increase in the likelihood of receiving welfare. The estimates suggest that child care subsidies are associated with greater work-related activities but also greater welfare participation. Most mothers who are on welfare do not work, and vice versa: only 5.6 percent of the sample works and receives welfare simultaneously. Another 5.5 percent attend school or are unemployed while receiving welfare; therefore, 11 percent of the sample is in a work-related activity while receiving welfare. That receiving a child care

Table 8:
Effects of Receiving a Child Care Subsidy

Outcome:	Employed	In School	Unemployed	Work-related activity	On Welfare
OLS Estimates					
1. No state-level variables; no lagged dependent vars.	.05 (.02)	.08 (.02)	-.006 (.012)	.13 (.02)	.10 (.02)
2. State-level variables included ^a ; no lagged dependent variables	.05 (.02)	.08 (.02)	-.005 (.012)	.12 (.02)	.10 (.02)
3. No state-level variables; lagged dependent variables ^b	.11 (.02)	.07 (.02)	-.019 (.013)	.16 (.02)	-.01 (.02)
4. Same as row 1, with Head Start cases classified as not receiving a subsidy	.06 (.02)	.08 (.02)	-.01 (.01)	.13 (.02)	.10 (.03)
2SLS Estimates					
5. Same as row 1; instruments are state dummies	-.25 (.21)	.33 (.10)	-.001 (.099)	.07 (.18)	.47 (.20)
6. Same as row 1; instruments are state characteristics ^c	.23 (.45)	.54 (.28)	-.23 (.24)	.54 (.42)	.13 (.64)

Notes: The complete results for the models in row 1 are given in the Appendix Table.

^a The state-level variables included in the outcome equations are the unemployment rate, median income, children in poverty, weekly child care reimbursement rate for infants and toddlers, and the income level at which the maximum fee is charged.

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

^c The identifying instruments are the unemployment rate, median income, children in poverty, weekly child care reimbursement rate for infants and toddlers, income level at which the maximum fee is charged, and the income eligibility limit for a child care subsidy divided by median income.

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 likely given priority for a subsidy, and the subsidy has a work requirement.

The second row presents results from a specification that includes state-level variables: median income, child poverty, the unemployment rate, and several child care policy variables.¹⁷ Adding these variables has very little impact on the estimated subsidy effect, and the state-level variables generally have small effects. The third row adds lagged dependent variables: 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, while the effects on school and unemployment decline somewhat. The total effect on work-related activities rises from .13 to .16. 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 a subsidy on employment suggests that the unobserved variables are negatively correlated with receipt of a subsidy. Adding these variables causes the effect 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 receiving a child care subsidy may not actually cause increased welfare receipt. Rather, receiving a child care subsidy is more likely when a family has been on welfare in the past, and past welfare

¹⁷ In addition, the welfare equation includes the state welfare benefit and whether the state requires job search as a condition of welfare receipt.

receipt is strongly associated with current welfare receipt. In the fourth row, we reclassify Head Start cases as not receiving a subsidy. This has negligible effects on the child care subsidy coefficient estimate.

Row 5 presents 2SLS estimates of the row 1 model, using state dummies as identifying instruments for receiving a child care subsidy. The estimated effects of receiving a child subsidy on employment, school enrollment, and welfare participation change drastically from the corresponding OLS estimates, and the standard errors blow up as well. The estimated subsidy effect on employment is -.25 with a standard error of .21. The effect on school enrollment rises from .08 to .33 with a standard error of .10. Thus, despite the five-fold increase in the standard error, we can reject a zero subsidy impact on school enrollment with a high degree of confidence, as in the OLS estimates. The effect on welfare participation rises from .10 to .47, with a standard error of .20. Row 6 replaces the state dummies with state characteristics and child care policy variables as identifying instruments. These estimates are quite different from the row 5 estimates, although the standard error estimates are also large. They suggest a large, positive effect on school enrollment, but the other estimates are much too imprecise to warrant any conclusions. Other 2SLS estimates not shown that include the lagged dependent variables and some of the state-level variables in the outcome equations are also highly variable and generally imprecise. State dummies and state-level characteristics turn out to be poor sources of identification of the child care effect, not surprisingly. Thus we place little weight on the 2SLS estimates.

In view of the fact that child care subsidy receipt is associated with both increased employment (and other work-related activities) 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 was 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 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 8. The estimated coefficients on the child care subsidy variable and associated simulation results are shown in Table 9. Four of the five subsidy

coefficient estimates are significantly different from zero Child care subsidies are associated with increased employment and work-related activities *conditional* on receiving welfare, but have a small negative effect on employment conditional on not receiving welfare. Child care subsidies have a very small positive effect on work-related activities conditional on not receiving welfare. These results suggest that child care subsidies succeed in increasing employment of welfare recipients but have little impact on employment of nonrecipients. The CCDF is intended to give priority for subsidies to current and former welfare recipients, and the evidence presented here indicates that this strategy may be a good way to maximize the employment impact of child care subsidies. However, a major caveat to this implication is that we have no sound basis for determining whether the effects we estimate are causal or reflect unobserved differences across mothers.

Table 9
Coefficient Estimates and Simulations from a Multinomial Logit Model

Dependent Variable Category	Coef. (s.e.) on child care subsidy	Simulated effect of receiving a child care subsidy
Welfare; Work	—	.067
No welfare; Work	-.95 (.18)	-.018
Welfare No work; Other work-related activity	-.05 (.24)	.064
No welfare No work; Other work-related activity	-.85 (.28)	.004
Welfare No work; No other work-related activity	-1.38 (.24)	-.04
No welfare No work; No other work-related activity	-2.11 (.32)	-.078

Notes: The other regressors in the model are those shown in the appendix table. 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.

Conclusion

Child care subsidies are an important part of welfare reform, and funding for such subsidies has grown rapidly in the last few years. There is little information available on whether child care subsidies have 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 2.5 percentage points more likely to be employed than nonrecipients, and about 5 percentage points more likely to be employed after controlling for a small set of family characteristics. Subsidy recipients were also about 8 percentage points more likely to be enrolled in school, no more likely to be unemployed, and about 15 percentage points more likely to be receiving welfare than nonrecipients. The school enrollment and unemployment differences are not affected by controlling for family characteristics, but the welfare participation difference falls to 10 percentage points. We have no sound basis for determining whether these are causal effects because we have access to no

source of plausibly exogenous variation in subsidy receipt. Taken at face value, these figures, along with the multinomial logit analysis, suggest that child care subsidies encourage employment and school enrollment among welfare recipients, but not among nonrecipients.

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 nonrecipients. Welfare participants are much less likely to be employed than nonparticipants, but the increase in employment associated with receiving a child care subsidy among welfare recipients is larger than among nonrecipients. However, our findings do not rule out another interpretation: conditional on employment and other work-related activities, child care subsidies increase welfare participation.

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 offer 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 model of behavior that can serve as a basis for specifying an empirical model. Assume that a young child requires continuous care by an adult. The mother provides the child care during her leisure hours. During her work and work-related hours she can receive free care from a relative or purchase child care in the market. 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 informal or formal, not a combination of the two. There is direct disutility from receiving a child care subsidy, as a result of stigma. A subsidy can only be received if income is below the eligibility limit *and* the family is offered a subsidy. We focus only on work and work-related activities, but the model could be extended to incorporate welfare as well. 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. We assume that a mother can either work or be in some other work-related activity, but she cannot do both. 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. We ignore child care quality, since it is not central to the analysis. The utility function, time constraints, budget constraint, and non-negativity constraints are as follows:

$$U = U(c, l, l_r, a, qs)$$

$$l + h + a = l_r + I = 1, \quad H + I = h + a, \quad IH = ha = 0$$

$$c = Y + hw - pH \quad \text{if } s=0$$

$$c = Y + hw - (p-r)H \quad \text{if } s=1, \text{ where } Y + hw \leq E$$

$$0 \leq l, h, l_r, I, H \leq 1,$$

where:

U	=	utility
c	=	consumption
l	=	the mother's leisure hours
l _r	=	the relative's leisure hours
a	=	the mother's hours spent in work-related activities (excluding employment)
q	=	the disutility of receiving a subsidy
s	=	binary indicator of subsidy receipt
h	=	the mother's hours of work
I	=	hours of unpaid child care by the relative
H	=	hours of paid child care
Y	=	nonwage income
w	=	the mother's wage rate
p	=	the price per hour of child care
r	=	the subsidy rate per hour of child care
E	=	the income eligibility limit for a child care subsidy
R	=	a binary indicator of whether an eligible family is offered a subsidy.

The family chooses $l, h, a, l_r, I, H, c,$ and s to maximize utility subject to the constraints.

There are two scenarios to consider. First, suppose the family is either ineligible for a subsidy regardless of hours worked ($Y > E$) or is eligible but rationed out ($Y \leq E, R = 0$). In this case $s = 0$ because subsidy receipt is not part of the choice set. The family then faces the following set of discrete alternatives:

- (1) not employed ($h = I = H = 0$);
- (2) employed, informal child care ($I = h > 0, a = H = 0$);
- (3) employed, formal child care ($H = h > 0, a = I = 0$);
- (4) work-related activity, informal child care ($I = a > 0, h = H = 0$);
- (5) work-related activity, formal child care ($H = a > 0, h = I = 0$);

In alternative (1) there is nothing to choose, while in alternative (2) the mother chooses h , with I, l , and l_r determined by the choice of h . In alternative (3) the mother chooses h , with H and l determined by the choice of h . Alternatives (4) and (5) are analogous to (2) and (3) with a substituted for h .

In the second scenario, the family is potentially eligible for a subsidy and a subsidy is offered ($Y \leq E$, $R=1$). In this scenario the family faces the following set of alternatives:

- (1) not employed ($h = I = H = 0$);
- (2) employed, informal child care only ($I=h>0$, $a=H=0$);
- (3) employed, formal child care, no subsidy ($H=h>0$, $a=I=0$, $s=0$);
- (4) work-related activity, informal child care ($I=a>0$, $h=H=0$);
- (5) work-related activity, formal child care, no subsidy ($H=a>0$, $h=I=0$, $s=0$);
- (6) employed, formal child care, subsidy ($H=h>0$, $a=I=0$, $s=1$; $Y + hw \leq E$).
- (7) work-related activity, formal child care, subsidy ($H=a>0$, $h=I=0$, $s=1$; $Y + hw \leq E$).

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.

The value of receiving a subsidy in this model is

$$V(s=1) = \text{Max}\{V_6(Y, E, p, r, w, q), V_7(Y, E, p, r, q)\}$$

where V_6 and V_7 are the indirect utility functions associated with alternatives (6) and (7). The value of not receiving a subsidy is

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

where V_i is the indirect utility associated with alternative i , $i=1-5$. A subsidy is received if $V(s=1) > V(s=0)$ and $Y \leq E$ and $R=1$. Otherwise a subsidy is not received. A reduced form model of subsidy receipt derived from this framework therefore has the form $s = s(Y, E, p, r, w, q, R)$.

The probability of employment conditional on receiving a subsidy is

$$\Pr(e=1 | s=1) = \Pr\{V_6(Y, E, p, r, w, q) > V_7(Y, E, p, r, q)\}$$

The probability of employment conditional on not receiving a subsidy is

$$\Pr(e=1 | s=0) = \Pr(\text{Max}\{V_2(Y, w), V_3(Y, w, p)\} > \text{Max}\{V_1(Y), V_4(Y), V_5(Y, p)\})$$

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

$$e = e(s, Y, E, p, r, w, q).$$

Notice that this probability does not depend on R , so R is in principle a valid identifying instrument. However, we do not have data on R . Even if data on R were available, it is likely that R would be correlated with unobserved components of preferences and constraints. E appears in the employment model because in alternatives (6) and (7) a subsidy can be received only if earnings plus other income is less than the eligibility limit. And r appears because the value of the subsidy influences the relative attractiveness of employment.

Appendix Table:

Full Results from OLS Estimates of the Outcome Equations

Outcome:	Employed	In School	Unemployed	Work-related activity	On Welfare
age	.034 (.009)	-.010 (.005)	-.003 (.005)	.021 (.008)	-.034 (.008)
age squared	-.00042 (.00013)	.00011 (.00006)	.000025 (.000072)	-.00029 (.00012)	.00040 (.00012)
Black	.030 (.043)	-.029 (.026)	.045 (.020)	.046 (.043)	.008 (.044)
White	.064 (.041)	-.035 (.025)	.002 (.019)	.031 (.042)	-.093 (.043)
Hispanic	-.071 (.021)	-.015 (.010)	.022 (.012)	-.064 (.021)	.052 (.020)
Good health	.093 (.028)	-.004 (.13)	-.013 (.017)	.077 (.028)	-.024 (.027)
educ 12-15	.276 (.020)	.025 (.008)	-.052 (.014)	.249 (.021)	-.144 (.020)
Educ 16+	.342 (.028)	.017 (.012)	-.059 (.016)	.299 (.026)	-.190 (.024)
Children aged 0-5 only	.057 (.020)	.008 (.010)	.002 (.012)	.067 (.019)	-.083 (.019)
Children aged 6-12 only	.128 (.019)	.011 (.009)	-.012 (.011)	.127 (.018)	-.096 (.018)
Northeast	-.127 (.020)	.056 (.010)	.014 (.010)	-.057 (.017)	-.004 (.018)
West	-.088 (.022)	.047 (.011)	.010 (.010)	-.031 (.019)	.061 (.021)
South	-.049 (.019)	.019 (.007)	.030 (.010)	.0005 (.016)	-.098 (.016)
CC subsidy	.052 (.023)	.080 (.017)	-.006 (.012)	.127 (.017)	.100 (.024)
Intercept	-.330 (.154)	.234 (.082)	.146 (.087)	.050 (.144)	1.16 (.144)
R2	.12	.04	.02	.10	.10

Notes: Sample size is 4,029. The estimates correspond to those in row 1 of Table 8.

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 DC: 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. See also, <http://www.acf.dhhs.gov/news/ccstudy.htm>
- Anderson, Patricia M., and Philip B. Levine. 2000. "Child Care and Mothers' Employment Decisions." In *Finding Jobs: Work and Welfare Reform*, Rebecca M. Blank and David Card, eds., New York: Russell Sage Foundation.
- Averett, Susan L., H. Elizabeth Peters, and Donald M. Waldman. 1997. "Tax Credits, Labor Supply, and Child Care." *Review of Economics and Statistics* 79(1): 125-135.
- 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): 635-642.
- Blau, David M. 2000. "Child Care Subsidy Programs," National Bureau of Economic Research (NBER) working paper no. 7806. Forthcoming in an NBER volume edited by Robert Moffitt.
- Blau, David M., and Alison P. Hagy. 1998. "The Demand for Quality in Child Care." *Journal of Political Economy* 106 (1): 104-146.
- Blau, David M., and Philip K. Robins. 1988. "Child Care Costs and Family Labor Supply." *Review of Economics and Statistics* 70(3): 374-381.
- Blau, David M., and Philip K. Robins. 1991. "Child Care Demand and Labor Supply of Young Mothers Over Time." *Demography* 28(3): 333-352.
- Bloom, Dan, Mary Farrell, James J. Kemple, and Nandita Verma. April 1999. *The Family Transition Program: Implementation and Three-Year Impacts of Florida's Initial Time-Limited Welfare Program*. New York: Manpower Demonstration Research Corporation.
- Bos, Johannes M., Aletha C. Huston, Robert C. Granger, Greg J. Duncan, Thomas W. Brock, and Vonnie C. McCloyd. August 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.
- Committee on Ways and Means, U.S. House of Representatives. 1998. *1998 Green Book*. Washington D.C.: U.S. Government Printing Office.
- Committee on Ways and Means, U.S. House of Representatives (2000). *2000 Green Book*. Washington D.C.: U.S. Government Printing Office.
- Connelly, Rachel. 1990. "The Cost of Child Care and Single Mothers: Its Effect on Labor Force Participation and AFDC Participation." Working paper. Brunswick, ME: Bowdoin College.
- Connelly, Rachel. 1992. "The Effects of Child Care Costs on Married Women's Labor Force Participation." *Review of Economics and Statistics* 74(1): 83-90.
- Connelly, Rachel, and Jean Kimmel. 1999. "Marital Status and Full-Time/Part-Time Work Status in Child Care Choices," Upjohn Institute, working paper 99-58. Kalamazoo MI: Upjohn.
- Fronstin, Paul, and Doug Wissoker. January 1995. "The Effects of the Availability of Low-Cost Child Care on the Labor-Supply of Low-Income Women." Working paper. Washington D.C., Urban Institute.
- 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." Paper presented at the Society for Research in Child Development Meeting, Albuquerque, New Mexico, April.
- Gelbach, Jonah. December 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.
- Gladden, Tricia, and Christopher Taber (2000). "Wage Progression among Less Skilled Workers." In *Finding Jobs: Work and Welfare Reform*, David Card and Rebecca Blank, eds. New York: Russell Sage Foundation.
- Granger, Robert C., and Rachel Cytron. 1999. "Teenage Parent Programs: A Synthesis of the Long-Term Effects of the New Chance Demonstration, Ohio's Learning, Earning, and Parenting Program, and the Teenage Parent Demonstration." *Evaluation Review* 23(2): 107-145.
- Hamilton, Gayle, Thomas Brock, Mary Farrell, Daniel Friedlander, and Kristen Harknett. December 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.
- Hamilton, Gayle, Stephen Freedman, and Sharon McGroder. June 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.

- Han, Wen-Jui, and Jane Waldfogel. July 1999. "The Effect of Child Care Costs on the Employment of Single and Married Mothers: Evidence from the Current Population Survey." Working paper, School of Social Work, Columbia University, New York.
- Heckman, James J. 1974. "Effects of Child-Care Programs on Women's Work Effort." *Journal of Political Economy* 82(2, part 2): S136-S163.
- Hotz, V. Joseph, and M. Rebecca Kilburn. August 1994. "Regulating Child Care: The Effects of State Regulations on Child Care Demand and Its Costs." Working paper. RAND, Santa Monica, Calif.
- Jacobson, Linda. 2000. "Are Child Care Options Expanding?" PACE Policy Brief, 1(1), Summer. <http://pace.berkeley.edu>.
- Kimmel, Jean. 1995. "The Effectiveness of Child Care Subsidies in Encouraging the Welfare-to-Work Transition of Low-Income Single Mothers." *American Economic Review Papers and Proceedings* 85(2): 271-275.
- Kimmel, Jean. 1998. "Child Care Costs as a Barrier to Employment for Single and Married Mothers." *Review of Economics and Statistics* 80(2): 287-299.
- Kisker, Ellen E., Anu Rangarajan, and Kimberly Boller. February 1998. Moving Into Adulthood: Were the Impacts of Mandatory Programs for Welfare-Dependent Teenage Parents Sustained after the Programs Ended? Princeton, N.J.: Mathematica Policy Research.
- Maddala, G.S. 1983. *Limited and Qualitative Dependent Variables in Econometrics*. New York: Cambridge University Press.
- 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): 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.
- Michalopoulos, Charles, and Philip K. Robins. August 1999. *Employment and Child-Care Choices in Canada and the United States*. New York: Manpower Demonstration Research Corporation.
- Michalopoulos, Charles, Philip K. Robins, and Irwin Garfinkel. 1992. "A Structural Model of Labor Supply and Child Care Demand." *Journal of Human Resources* 27(1): 166-203.
- Miller, Cynthia, Virginia Knox, Patricia Auspos, Jo Anna Hunter-Means, and Alan Orenstein. September 1997. "Making Welfare Work and Work Pay: Implementation and 18-Month Impacts of the Minnesota Family Investment Program." New York: Manpower Demonstration Research Corporation.
- Mroz, Thomas A. 1999. "Discrete Factor Approximations in Simultaneous Equation Models: Estimating the Impact of a Dummy Endogenous Variable on a Continuous Outcome." *Journal of Econometrics* 92: 233-274.
- Pitegoff, Peter, and Lauren Bream. 1997. "Child Care Policy and the Welfare Reform Act." *Journal of Affordable Housing and Community Development Law* 6 (2): 113-130.
- Powell, Lisa M. 1997. "The Impact of Child Care Costs on the Labour Supply of Married Mothers: Evidence from Canada." *Canadian Journal of Economics* 30(3): 577-594.
- Quint, Janet C., Johannes M. Bos, and Denise F. Polit. October 1997. *New Chance: Final Report on a Comprehensive Program for Young Mothers in Poverty and Their Children*. New York: Manpower Demonstration Research Corporation.
- Ribar, David. 1992. "Child Care and the Labor Supply of Married Women: Reduced Form Evidence." *Journal of Human Resources* 27(1): 134-165.
- Ribar, David. 1995. "A Structural Model of Child Care and the Labor Supply of Married Women." *Journal of Labor Economics* 13(3): 558-597.
- Riccio, James, Daniel Friedlander, and Stephen Freedman. September 1994. *GAIN: Benefits, Costs, and Three-Year Impacts of a Welfare-to-Work Program*. New York: Manpower Demonstration Research Corporation.
- Robins, Philip K. 1991. "Child Care Policy and Research: An Economist's Perspective." In *The Economics of Child Care*, David Blau, ed. New York: Russell Sage Foundation.
- Robins, Philip K. and Robert Spiegelman. 1978. "An Econometric Model of the Demand for Child Care." *Economic Inquiry* 16 (January): 83-94.
- Schumacher, Rachel, and Mark Greenberg. October 1999. *Child Care after Leaving Welfare: Early Evidence from State Studies*. Washington, D.C.: Center for Law and Social Policy. Available at: <http://www.clasp.org/pubs/childcare/>
- Tekin, Erdal. November 2000. "An Analysis of Single Mothers' Child Care, Employment, and Welfare Choices." Working paper. Department of Economics, University of North Carolina at Chapel Hill.
- Tunali, Insan. 1986. "A General Structure for Models of Double-Selection and an Application to a Joint Earnings/Migration Process with Remigration." *Research in Labor Economics* 8(Part B): 235-282.

- U.S. General Accounting Office. 1994a. "Early Childhood Programs: Multiple Programs and Overlapping Target Groups." GAO/HEHS-95-4FS, report. Washington D.C.: GAO.
- U.S. General Accounting Office. 1994b. "Child Care Subsidies Increase the Likelihood that Low-Income Mothers Will Work." GAO/HEHS-95-20, report. Washington D.C.: GAO.
- U.S. General Accounting Office. 1998. "Welfare reform: States' Efforts to Expand Child Care Programs." GAO/HEHS-98-27, report. Washington D.C.: GAO.