The Relative Effectivenes of Welfare Programs, Earnings Subsidies, and Child Care Subsidies as Work Incentives for Single Mothers

by
Emil Rusev

A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Economics.

Chapel Hill
2007

Approved by:

Wilbert van der Klaauw, Advisor

David M. Blau, Reader

Thomas A. Mroz, Reader

Donna B. Gilleskie, Reader

Helen V. Tauchen, Reader

© 2007
Emil Rusev
ALL RIGHTS RESERVED

ABSTRACT

EMIL RUSEV: The Relative Effectivenes of Welfare Programs, Earnings Subsidies, and Child Care Subsidies as Work Incentives for Single Mothers (Under the direction of Wilbert van der Klaauw)

Welfare programs, earnings subsidies, and child care subsidies provide incentives for single parents to escape poverty through employment. Each of these policies has been studied in the economics literature, but little is known about how well they perform relative to each other. In this dissertation I consider the impact of tax and transfer programs on welfare take-up, paid child care usage, and hours of work for single mothers. I estimate a structural model of labor supply and multiple program participation by Simulated Maximum Likelihood, utilizing data from the Survey of Income and Program Participation. I use the estimates to simulate the impact of several alternative policy reforms, such as changes in the Earned Income Tax Credit (EITC) program parameters, as well as provision of child care and wage subsidies. I find that targeted wage subsidies are the most cost-effective method of encouraging work among single mothers. While not as effective as wage subsidies, the EITC and child care subsidies also induce work and reduce poverty. Additionally, I apply the recently proposed consistent Transformed Simulated Frequency (TSF) estimator by Lee and Song (2006) and compare the results with those from the more traditional smoothed SMLE (Lerman and Manski 1981).

ACKNOWLEDGMENTS

I would like to thank my advisor Wilbert van der Klaauw who helped me develop interest in discrete choice models and the Earned Income Tax Credit. He has been extremely patient and supportive. I am also very grateful to David Blau, Tom Mroz, Donna Gilleskie, Helen Tauchen, and Paul Rhode for valuable comments.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

EITC	Earned Income Tax Credit
SIPP	Survey of Income and Program Participation
SML	Simulated Maximum Likelihood
TSF	Transformed Simulated Frequency

Chapter 1

Introduction

Welfare programs, earnings subsidies, and child care subsidies provide alternative approaches to encourage single mothers to work and thereby potentially bring them out of poverty. Expenditures on the Earned Income Tax Credit (EITC) more than doubled to $27 billion between 1993 and 1997 and this expansion has been credited with causing a considerable increase in employment among single mothers. Could the effects of the EITC have been achieved at a lower cost with a different policy? We know little about the relative performance of alternative policies targeted at increasing the well-being of single mothers.

Economists have considered the effects of the Welfare Reform of 1996 and the EITC expansions on earnings and hours of work by comparing pre- and post-reform outcomes, but their analyses are generally unable to disentangle the separate impacts of the two programs. It is difficult, using the simple before- and after comparison strategy (with or without a comparison group), to assess how multiple programs interact in influencing work decisions. The unified structural analysis of work and multiple welfare program participation in this paper alleviates this problem by explicitly modeling individual choices given the choice set induced by various programs. In order to determine the impact of tax and welfare programs on the work decisions of single mothers, I estimate a structural model of labor supply and multiple program participation by Simulated Maximum Likelihood. In the model, individuals maximize their utility by choosing how much labor to supply and whether to participate in either or both Food Stamps (FS) and the Temporary Assistance for Needy Families (TANF). Using state-level benefit formulas, the budget constraint takes into account welfare benefits, income taxes, and tax credits for every feasible combination of employment and welfare alternatives.

The model also incorporates child care costs and subsidies as important determinants of labor supply. I estimate the model with data from the Survey of Income and Program Participation (SIPP) and use the estimates to simulate the impact of several alternative policy reforms, including changes in the EITC, provision of child care, wage subsidies, and certain features of the United Kingdom's version of the EITC.

The results indicate that, for equal cost, a subsidized minimum wage outperforms the EITC in increasing employment and reducing poverty among single mothers by better targeting low-wage workers. Likewise, reallocating EITC funds into child care subsidy programs yields better results in terms of increased employment and well-being of the poor. The EITC is effective in reducing poverty but has the additional effect of reducing the hours of those already working. If TANF recipients decide to work more, they do not receive the full additional income since their TANF benefits are reduced. Reductions in the rate at which the benefit is phased out, while keeping the maximum benefit the same, does little to affect the labor supply and well-being of single mothers as workers with higher earnings become eligible for benefits.

I compare the results from two different SML methods - a smooth Lerman and Manski (1981) SML estimator and Lee and Song's (2006) Transformed Simulated Frequency (TSF) SML estimator. While the results are very similar for large simulation size, the TSF estimator performs better with fewer simulations.

Chapter 2 provides a brief summary of previous findings in the literature on the impact of work-incentive reforms, with an emphasis on TANF, EITC, and child care subsidies. Chapter 3 summarizes the history, goals, and rules of the programs in place in 1997, the year for which I use SIPP data. Chapter 4 lays out the econometric model and the estimation method. Chapter 5 describes the data. Chapter 6 discusses the results and policy simulations. Chapter 7 concludes.

Chapter 2

Previous Findings

The effects of the EITC on work have been studied extensively. Reduced form studies of the EITC mostly focus on different trends for various groups of the population. They try to identify an average treatment effect of a policy change, relying on provisions that affected a treatment and a comparison group differently. Single mothers have received special attention in the EITC literature. Their employment outcomes over time have been compared with those of various comparison groups (single women without children, black men). Meyer and Rosenbaum (2000) also use married mothers as a control group, finding that the rise in employment of single mothers is not likely a result of factors affecting all mothers, such as child care subsidies.

While comparison groups are rarely perfect and can be criticized, the consistently positive estimated effect of the EITC on employment, using a variety of comparison groups strongly suggests a causal effect of the major EITC expansions in the 1980s and 1990 s (Meyer and Rosenbaum 2000; Eissa and Liebman 1996; Ellwood 2000). These findings are also supported by studies using other econometric methods (Dickert, Houser and Scholz 1995; Meyer and Rosenbaum 2001; Keane and Moffitt 1998).[1]

There have been several complete reviews of the literature regarding the effects of Aid to Families with Dependent Children (AFDC; the predecessor of TANF) on labor supply (Danziger et al. 1981; Moffitt 1992; Hoynes 1997) and a major review of the TANF program by Moffitt (2003). Even though TANF introduced new dimensions, intended to encourage work

[1]For a complete survey of work on the EITC, see Hotz and Scholz (2003)

(work requirements, time limits), research on AFDC is relevant since the incentives implied by the benefit formulas have not changed dramatically. Generally, studies on AFDC confirm the prediction of the static labor supply model that the program discouraged work. Increased generosity of the benefits is associated with higher welfare participation rates. Studies have consistently found that hours worked are quite insensitive to reductions in the rate at which benefits are phased out with the increase in income (see Moffitt 1992; Hoynes 1996; Keane and Moffitt 1998). Generally, TANF benefits have a similar structure, and the implicit marginal tax rates in TANF benefit formulas could be expected to have similar effects.

Due to the introduction of new features, such as work requirements and time limits, much of the TANF research has been focused in a different direction: estimating the overall effect of replacing AFDC with TANF. Studies have generally used cross-state variation in timing of welfare introduction to identify treatment effects of the welfare reform on earnings, labor supply, and AFDC-TANF participation. Moffitt (2003) discusses TANF research problems in detail. First, the introduction of TANF occurred at approximately the same time in all states, making the evaluation of individual components of TANF difficult. Second, states were free to not only set the benefit parameters (benefit standard, benefit tax rates, exemptions) but also the type of benefit formulas used. Generally cross-state variation is good for identification of estimated parameters but the rules are more complicated than under AFDC and modeling those rules is challenging.

Research based on cross-state variation in the timing of the introduction of pre-1996 welfare waivers generally finds positive effects on employment and negative effects on AFDC participation (Schoeni and Blank 2000; O'Neill 2001; Bloom and Michalopoulos 2001). Most studies that evaluated the effects of the actual introduction of the Welfare Reform have employed difference-in-difference estimators by using variation in outcome trends across different groups of the population (e.g., low-wage and high-wage single mothers). Results vary significantly and attribute either positive (McKernan 2000), negative (Wallace 1999), or indeterminate (Ellwood 2000) effects to TANF on employment.

A large number of studies have estimated the effects of the price of child care on employment of mothers. To the extent that child care subsidies reduce the net price of child care, they are expected to provide a work incentive. The majority of papers estimate a binomial choice model of work, with the price of child care predicted from a child care expenditure equation estimated on the subsample of cases for which child care expenditures are reported (Connely 1992; Kimmel 2000; Anderson 2000 and Levine). Other models estimate the work decision equation jointly with equations that model hours of care use (Blau and Robins 1991; Ribar 1992). Research results suggest that subsidies tend to increase employment rates of mothers of young children but the estimated price elasticities vary from 0.06 to -1.26, even though some studies use the same sources of data. Blau (2003) suggests that the variation in econometric techniques and specifications is very likely a main reason for these inconsistencies. Several studies focus on the effect of availability of a child care subsidy on employment, using actual subsidy programs and overall find it to be positive. Most (Gelbach 2002; Meyers, Heintze, and Wolf 2002; Blau and Tekin 2002) report no information on either child care prices or the size of the subsidy, so an elasticity cannot be computed.

Food Stamp studies usually focus on the general effectiveness of the program, and whether aid gets to the intended recipients. This is understandable, since the program is intended as safety net, fighting undernutrition. Work disincentives, caused by FS, are mostly considered jointly with those caused by the AFDC/TANF programs. The estimated effects of moderate changes in the maximum benefits or benefit phase-out rates on hours worked for single mothers are weak (Fraker and Moffitt, 1988; Keane and Moffitt, 1998). [2] I include Food Stamp benefits in the budget constraint and briefly discuss takeup of benefits in the results section.

In this work I analyze the joint and separate effects of the Earned Income Tax Credit, Food stamps, child care subsidies and TANF on employment and welfare parficipation decisions of single mothers by developing and estimating a unified behavioral model. Before describing the model and its estimation with data from the Survey of Income and Program Participation, I will first discuss in more detail the welfare programs the women in my estimation sample faced.

[2] See Currie (2003) for a more detailed review of work disincentives of food programs in the U.S.

Chapter 3

Overview of the Programs

3.1 History, Rules, and Goals

The Temporary Assistance for Needy Families (TANF) program was introduced with the Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) in 1996. It replaced the Aid to Families with Dependent Children (AFDC) welfare program as the main federal welfare program in the United States. The new act specified a block grant funding scheme from the federal government to the states to replace AFDC matching grants. It also imposed time limits on benefit receipt and more stringent requirements, such as job training, job search, and work. In addition to being able to choose the benefit levels, states are also free to set their own eligibility restrictions and design the benefit formulas. Each state decides, whether to use an asset eligibility test, what is considered an asset, and what fraction of an asset's value counts for TANF purposes. Similarly, states have a great degree of control over income eligibility tests.

For participants, the path to receiving benefits consists of determining their eligibility and computing the benefits. To be eligible, the 'assistance unit' first has to pass a set of tests based on family composition and demographic characteristics of its members. Most importantly, the family needs to include a dependent child. States differ in how they treat two-parent families, families headed by a minor, pregnant women, and non-citizens. In addition to satisfying the nonfinancial eligibility tests, the family must have assets below a certain specified level, which varies from state to state. Finally, an income test is applied by comparing family income to an eligibility threshold. Certain portions and types of income are disregarded. If the family passes the income test, it is eligible for the program, and a benefit is computed.

To calculate benefits, states use a variety of different formulas but they all share some general principles. Usually, families can disregard a part of their earned income. The resulting 'net income' is subtracted from the state payment standard for a family with zero income, which varies by family size. The benefit is then a fraction of the difference between the payment standard and the net income. Table 3.2 summarizes TANF benefit formula parameters for all states, for a family of three. On average, single mother households in my sample are eligible for \$323 per month, but benefits vary greatly across states, from \$137 in Alabama to \$923 in Alaska. Benefit schedules in most states imply marginal tax rates of 100 percent. Some of them also impose a maximum benefit amount that can be potentially lower than the one implied by the benefit formula table 3.2.

The food stamp program was first implemented in 1964, with the current structure in effect since 1977. The goal of the program is to provide food assistance to low-income households. It is administered by the federal government and there is no variation in the benefit formula across states. To be eligible for food stamp benefits, the household must pass net income and asset tests, after which the food stamp formula is applied and the benefit determined. A household's benefit amount is determined by its monthly net income, which is defined as its monthly gross income minus deductions. The benefit amount is determined as

$$FS = MAX(M - 0.3 * Net\,Income,\ 0)$$

where M varied from \$218 for a family of two to \$806 for a family of nine or more in 1997. In 1997, the amounts disregarded from earnings included a standard deduction of \$134; an earned income deduction of 20 percent; dependent care expenses; legally owed child support; and excess shelter deductions, with the first two deductions being the most significant ones.

The Federal Earned Income Tax Credit was established in 1975 as a modest work bonus to offset Social Security taxes of low-income individuals. Between 1978 and 1986 the EITC benefit was not adjusted for inflation. With the introduction of the Tax Reform Act of 1986 (TRA86) the EITC was increased back up to its 1975 level in real terms. The federal EITC became more generous with the 1990 and 1993 tax bills. (See Hotz and Scholz (2003) for a detailed history of the EITC.) The EITC has been politically popular as a strong work incentive.

Taxpayers can claim their EITC by providing eligibility information in a special section of their federal tax return form. To be eligible for the EITC, a taxpayer needs to have positive earned income below a certain threshold, which depends on the number of qualifying children and the presence of a spouse. A qualifying child must be under 19 years of age (24 if a full-time student). The claimant of the credit must be a parent or a grandparent of the child, or the child must be a foster child. In 1997, taxpayers with at least 2 qualifying children could receive EITC at a rate of 40 percent of each dollar of earnings up to an income level of $9,140, for a maximum credit of $3,656. If income is above $9,140 but less than $11,930, the maximum credit is received. At income levels above $11,930, the credit is phased out at a rate of 21.06 percent per marginal dollar of earnings so that taxpayers with income above $29,290 are not eligible to receive any tax credit. For taxpayers with only one child the phase-in rate is 34 percent, the maximum credit is $2,210 for income up to $11,930 and the phase-out rate is 15.98 percent. The tax credit is refundable, which means that if the credit exceeds the tax liability, the Treasury Department will pay back the difference to the taxpayer. A summary of program parameters for the period 1975-2003 is presented in Table 3.3.

Take-up of the EITC is an interesting question in its own right. Household surveys generally provide fairly detailed information that allows one to determine eligibility, but information on take-up is either not provided or imprecise (the topical module that includes EITC data in the SIPP has a very low response rate). Scholz (1994) has a preferred estimate of between 80 and 86 percent for the general eligible population for 1990. In a report by the U.S. General Accountability Office (1998), the participation rates for households with one and two qualifying children were 96 and 93 percent, respectively. The GAO-estimated participation rates for households with three or more children are somewhat lower.

Following the increased attention from the federal government with TRA86, some states began introducing their own earned income tax credits in the late 1980s. In 1997, nine states had their own EITC. In some of these states the credit was refundable, while in others it was not (the credit was limited only to the amount of the state tax liability). The amount of the credit is typically defined as a fraction of the federal credit and varies between 4 and 43 percent (see Table 3.1). Therefore, the eligibility rules for the federal credit apply. The maximum state EITC could vary between $110 for a family with one child in the state of Oregon to $1,572 for a family with three or more children in Wisconsin.

Since World War II, a rapidly growing fraction of mothers in the U.S. has chosen to be part of the labor force. A large number of mostly federally funded programs that subsidize child care expenses were introduced over time to help finance the increased need for child care faced by low-income families. By the 1990s a complex system of child care subsidies was in place. The programs were administered by a large number of federal agencies. In 1994, over 90 federal child care related programs were active (GAO 1998). Coordination in provision of child care subsidies was very difficult, with different eligibility and application rules for different programs.[1]

PRWORA consolidated several major child care programs into a single child care block grant, the Child Care and Development Fund (CCDF). Federal CCDF funds received by states depend in part on the number of children and state income. Another part of CCDF funding requires matching spending by the states, which have to maintain expenditures for child care programs at certain minimum levels. The states set eligibility criteria, subject to some restrictions. They may assist families with incomes up to 85 percent of the state median income but are also allowed to choose a lower threshold. Parents must be involved in work or work related activities. States must use at least 70 percent of their mandatory and matching funds to assist families on welfare or likely to go on welfare. States are supposed to issue vouchers that families can use to purchase care from any child care provider. Sometimes states can also purchase slots in child care centers directly. Eligibility for child care assistance and the amount of that assistance are determined by the state and are based on an Annual Income Eligibility Level, the age of the child, and the cost of child care to the family. However, the subsidy is financed through a block grant ($4 billion in 1997) which covers only an estimated

[1] An extensive description of the history of child care subsidy programs can be found in Blau (2003) and the Green Book (1998).

15 percent of eligible families (Child Care Bureau 1999). While CCDF is the major means-tested child subsidy program, it accounts for less than 50% of federal and state expenditures. Other major programs are the Dependent Children Tax Credit, Head Start, the Child and adult Care Food Program, and the Title XX Social Services Block Grant.[2]

3.2 Incentives

In this section I present the work incentives provided by the programs of interest. It is important to understand these since programs often have undesirable effects which are overlooked at the time of implementation of the programs.

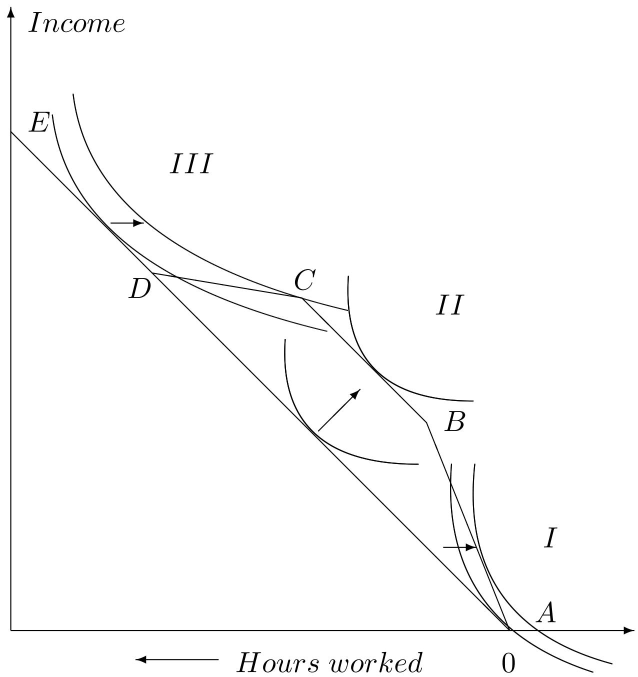
The static labor supply model is simple and very useful for understanding the potential effects of modifying program parameters on the optimal work choices of single mothers.

In the absence of any government transfers in figure 3.1 below, the individual budget constraint in hours-of-work - consumption space will be AE, with a slope of $-w$. The introduction of the EITC changes the budget constraint to be $ABCDE$ instead. Let us consider how individuals with various preferences are affected by the EITC. For some nonworking individuals in the absence of the EITC (type I preferences on the graph) it will be optimal to start working. In this phase-in region, the EITC is essentially a 40% wage subsidy that increases the returns from participation in the labor market. In other words, there is a positive substitution effect on the number of hours worked, and no income effect for nonworkers. Consequently, the EITC unambiguously encourages work.

For type II individuals, who are around the flat range of the credit, there is no substitution effect on hours of work. There will only be an income effect which economics literature indicates is negative, that is, leisure is a normal good. Type III individuals will experience an income effect, as well as a negative substitution effect, as their income is taxed implicitly in the phase-out range of the credit. In short, the static labor supply model expects an unambiguously positive effect on labor force participation and a negative effect on the hours

[2]See Blau (2003) for details

Figure 3.1: EITC effects on work decisions



of work for individuals already in the labor force.

Let us consider the effects of a child care subsidy. The line labelled w on graph 3.2 is, again, the budget constraint in the absence of any transfers. If the mother has to incur an hourly cost of child care, p, then the budget constraint becomes $w - p$. The child care price p may make the mother find it optimal not to work. Providing a child care subsidy of s has the potential of inducing some mothers to join the labor force, as indicated by the indifference curves on the graph. This simple linear subsidy example is identical to the phase-in range of the EITC and will predict an increase in employment. For individuals already in the labor force, there will be a positive substitituion effect on hours worked and an income effect. Consequently, the effect on hours of work for workers will depend on the relative magnitudes of the income and substitution effects. While child care subsidies are not typically linear, this will affect the size of the effect but not its direction.

In the same static labor supply framework, the non-transfer budget constraint in figure 3.3 is AD. The introduction of TANF shifts the constraint to $ABCD$. This causes individuals similar to type I to quit work and start collecting welfare, which is less likely to happen if the marginal tax rate implied by the TANF benefit schedule is reduced. On the graph this

Figure 3.2: Effects of a linear child care subsidy on work decisions

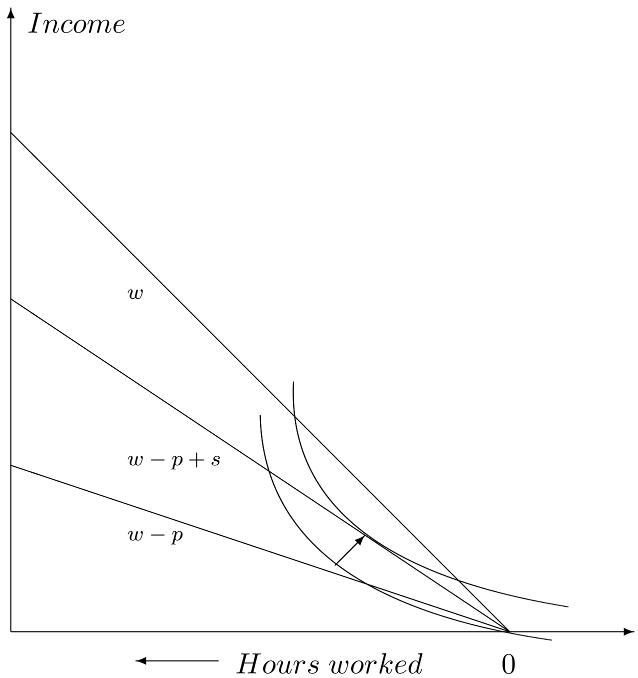


Figure 3.3: Effects of TANF on work decisions

$$Benefit = Benefit\ Standard(AB) - \%\ of\ Income$$

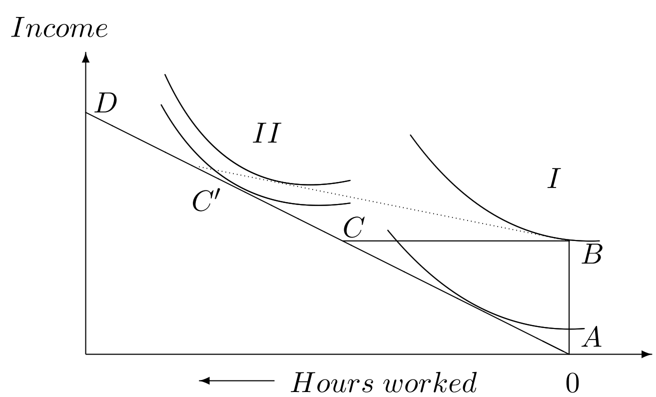


Table 3.1: State EITC in states that had enacted their own credit by 1997

State	Refundable	Time enacted	% of Credit
Iowa	No		6.5% of fed. EITC
Maryland	No	1987	50% of fed. EITC non-refundable, 20% refundable
Massachusetts	Yes	1997	15% of fed. EITC
Minnesota	Yes	1991/92	varies depending on income, children, etc.; average 33%
New York	Yes	1994	30% of fed. EITC
Oregon	No	1997	5% of fed. EITC
Rhode Island	No	1986	25% of fed. EITC
Vermont	Yes	1988	32% of fed. EITC
Wisconsin	Yes	1989	4% of fed. EITC if 1 child, 14% 2 children, 43% 3 or more children

Source: The Hatcher Group, State EITC On-Line Resource Center at www. stateeitc.com

is illustrated by replacing the BC portion of the budget line (100% marginal tax rate in this example) by CC'. This, in turn, has the potential of reducing hours of work for individuals of type II who start working less in order to become eligible or to increase their benefits. An increase in AB, on the other hand, will tend to decrease hours of work. The structure of Food Stamps benefits is the same as the one for TANF, as evident from the formula above, so we expect the same directions of employment incentives.

Table 3.2: TANF Benefit Computation for a Family of Three, 1997

State	Form of Benefit Formula	Benefit Standard	Maximum Benefit	% in Formula
Alabama	B. St. - Net Income	164	n.a.	100
Alaska	Smaller of (% of B. St. - Net Income) or Max B.	1057	923	87.43
Arizona	B. St. - Net Income	347	n.a.	100
Arkansas	Flat Amount of $204	n.a.	n.a.	100
California	B. St. - Net Income	565	n.a.	100
Colorado	% of (B. St. - Net Income)	421	n.a.	84.75
Connecticut	B. St. - Net Income	543	n.a.	100
Delaware	Smaller of (% of (B. St. - Net Income)) or Max B.	786	338	50
D.C.	B. St. - Net Income	379	n.a.	100
Florida	B. St. - Net Income	303	n.a.	100
Georgia	Smaller of (B. St. - Net Income) or Max B.	424	280	100
Hawaii	B. St. - Net Income	570	n.a.	100
Idaho	Smaller of (B. St. - Net Income) or Max B.	991	317	100
Illinois	B. St. - Net Income	337	n.a.	100
Indiana	B. St. - Net Income	288	n.a.	100
Iowa	B. St. - Net Income	426	n.a.	100
Kansas	B. St. - Net Income	429	n.a.	100
Kentucky	Smaller of (% of (B. St. - Net Income)) or Max B.	526	262	55
Louisiana	B. St. - Net Income	190	n.a.	100
Maine	Smaller of (B. St. - Net Income) or Max B.	553	418	100
Maryland	B. St. - Net Income	377	n.a.	100
Massachusetts	B. St. - Net Income	579	n.a.	100
Michigan	B. St. - Net Income	459	n.a.	100
Minnesota	B. St. - Net Income	532	n.a.	100
Mississippi	Smaller of (% of (B. St. - Net Income)) or Max B.	368	120	60
Missouri	B. St. - Net Income	292	n.a.	100
Montana	B. St. - Net Income	438	n.a.	100
Nebraska	B. St. - Net Income	342	n.a.	100
Nevada	B. St. - Net Income	348	n.a.	100
New Hampshire	B. St. - Net Income	550	n.a.	100
New Jersey	B. St. - Net Income	424	n.a.	100
New Mexico	B. St. - Net Income	389	n.a.	100
New York	B. St. - Net Income	577	n.a.	100
North Carolina	% of (B. St. - Net Income)	544	n.a.	50
North Dakota	% of (B. St. - Net Income)	431	n.a.	59.56
Ohio	B. St. - Net Income	341	n.a.	100
Oklahoma	B. St. - Net Income	307	n.a.	100
Oregon	B. St. - Net Income	460	n.a.	100
Pennsylvania	B. St. - Net Income	403	n.a.	100
Rhode Island	B. St. - Net Income	554	n.a.	100
South Carolina	Smaller of (B. St. - Net Income) or Max B.	540	200	100
South Dakota	% of (B. St. - Net Income)	507	n.a.	85
Tennessee	Smaller of (B. St. - Net Income) or Max B.	677	185	100
Texas	B. St. - Net Income	188	n.a.	100
Utah	B. St. - Net Income	426	n.a.	n.a.
Vermont	B. St. - Net Income	611	n.a.	100
Virginia	Smaller of ((B. St. - Net Income) or Max B.)	Poverty	291	100
Washington	Smaller of (B. St. - Net Income) or Max B.	546	546	100
West Virginia	B. St. - Net Income	253	n.a.	100
Wisconsin	B. St. - Net Income	518	n.a.	100
Wyoming	Smaller of (B. St. - Net Income) or Max B.	590	340	100

Source: The Welfare Rules Database, http://anfdata.urban.org/WRD

Note: B. St. = Benefit Standard

Table 3.3: Federal EITC parameters, 1975-2003

Year	No. of children	Phase-in rate	End of Phase-in range	Maximum credit	Phase-out rate	Phase-out range Begin	Phase-out range End
1975-1978		10	4,000	400	10	4,000	8,000
1979-1984		10	5,000	500	12.5	6,000	10,000
1985-1986		14	5,000	550	12.22	6,500	11,000
1987		14	6,080	851	10	6,920	15,432
1988		14	6,240	874	10	9,840	18,576
1989		14	6,500	910	10	10,240	19,340
1990		14	6,810	953	10	10,730	20,264
1991	one child	16.7	7,140	1,192	11.93	11,250	21,250
	two children	17.3	7,140	1,235	12.36	11,250	21,250
1992	one child	17.6	7,520	1,324	12.57	11,840	22,370
	two children	18.4	7,520	1,384	13.14	11,840	22,370
1993	one child	18.5	7,750	1,434	13.21	12,200	23,050
	two children	19.5	7,750	1,511	13.93	12,200	23,050
1994	no child	7.65	4,000	306	7.65	5,000	9,000
	one child	26.3	7,750	2,038	15.98	11,000	23,755
	two children	30	8,425	2,528	17.68	11,000	25,296
1995	no child	7.65	4,100	314	7.65	5,130	9,230
	one child	34	6,160	2,094	15.98	11,290	24,396
	two children	36	8,640	3,110	20.22	11,290	26,673
1996	no child	7.65	4,220	323	7.65	5,280	9,500
	one child	34	6,330	2,152	15.98	11,610	25,078
	two children	40	8,890	3,556	21.06	11,610	28,495
1997	no child	7.65	4,340	332	7.65	5,430	9,770
	one child	34	6,500	2,210	15.98	11,930	25,750
	two children	40	9,140	3,656	21.06	11,930	29,290
1998	no child	7.65	4,460	341	7.65	5,570	10,030
	one child	34	6,680	2,271	15.98	12,260	26,473
	two children	40	9,390	3,756	21.06	12,260	30,095
1999	no child	7.65	4,530	347	7.65	5,670	10,200
	one child	34	6,800	2,312	15.98	12,460	26,928
	two children	40	9,540	3,816	21.06	12,460	30,580
2000	no child	7.65	4,610	353	7.65	5,770	10,380
	one child	34	6,920	2,353	15.98	12,690	27,415
	two children	40	9,720	3,888	21.06	12,690	31,152
2001	no child	7.65	4,760	364	7.65	5,950	10,710
	one child	34	7,140	2,428	15.98	13,090	28,281
	two children	40	10,020	4,008	21.06	13,090	32,121
2002	no child	7.65	4,910	376	7.65	6,150	11,060
	one child	34	7,370	2,506	15.98	13,520	29,201
	two children	40	10,350	4,140	21.06	13,520	33,178
2003	no child	7.65	4,990	382	7.65	6,240	11,230
	one child	34	7,490	2,547	15.98	13,730	29,666
	two children	40	10,510	4,204	21.06	13,730	33,692

Chapter 4

Model and Estimataion

4.1 Model

To analyze the choices single mothers make regarding work, welfare participation, and child care expenditures, I specify a discrete choice model, partially based on Keane and Moffitt (1998), that characterizes the preferences and constraints these mothers faced in 1997.

Mothers in the model have three work-hours choices - 0 (no work), 20 (part-time work), and 40 (full-time work). The distinction between part- and full-time is crucial because most mothers who work full-time earn too much to qualify for welfare, while low-wage part-time workers typically have earnings below the eligibility threshold. Part- and full-timers are also likely to have different child care needs and therefore different costs.

As will be shown later in the paper when describing the data, participation rates for TANF and Food Stamps in the sample are low. Thirty-eight percent of non-workers participate in neither program. I estimate that the take-up rate of TANF among eligible single mothers is around 38 percent (This is consistent with Moffitt (2003)). On the other hand, a large number of part-time workers could increase their disposable income by simply quitting their jobs and collecting welfare, since the combined implicit marginal tax rate of TANF and FS is more than 100 percent. These two observations imply that there are costs associated with welfare participation. Some examples of such costs are disutility from dealing with administrative issues to sign up for welfare programs, direct monetary costs, and the stigma of being on welfare (Moffitt 1983). Accounting for non-monetary costs of participation requires joint estimation of the labor supply decision and program participation since unobservable determinants of these choices are likely to be correlated.

On the other hand, previous work has estimated EITC take-up rates of between 80 and 96 percent (Scholz 1994, GAO 1998), and to avoid having to model an additional decision, I therefore assume in this model that families always collect the federal and state EITC benefits for which they are eligible.

In specifying the utility function, I follow Keane and Moffitt (1998) and define a function that is quadratic in consumption and hours of work:

$$\begin{aligned} U(H, Y, P_T, P_F) = {} & \alpha H + Y + \beta_{HH} H^2 + \beta_{YY} Y^2 + \psi_T P_T + \psi_F P_F + \psi_{TF} P_T P_F \\ & + \beta_{HY} HY + \delta_T H P_T + \delta_F H P_F + \eta_T Y P_T + \eta_F Y P_T, \end{aligned} \tag{4.1}$$

where H is hours of work, P_m is an indicator variable for participation in program m ($m = T$ for TANF, $m = F$ for Food Stamps), Y is income (assumed to be equal to consumption), and

$$\alpha = \boldsymbol{x'_{\alpha}} \underline{\alpha} + \epsilon_{\alpha}. \tag{4.2}$$

$$\psi_m = \boldsymbol{x'_m} \psi_m + \epsilon_m, m = T, F \tag{4.3}$$

Here, α is the marginal utility of work at zero hours, which is allowed to vary across individuals with observable ($\boldsymbol{x}$) and unobservable characteristics (ϵ_{α}). ψ_T and ψ_F capture the utility costs of program participation in TANF and FS, respectively. The sign of ψ_{TF} indicates whether the cost of participating in both programs is different from the sum of the costs of participating in these programs separately. It is possible that mothers with different levels of consumption and hours of work have different preferences towards welfare participation. These effects are captured in the utility function by the coefficients on the interaction terms between Y and H with the program participation indicators, δ_T ,δ_F ,η_T, and η_F. I do not explicitly impose TANF work requirements in the model and, currently, there are no control variables in equation (4.3) to account for utility differences across states due to different activities requirements. The effects of TANF work requirements that are common across states are captured by coefficients on costs of participation, ψ_T, ψ_{TF}, δ_T, and η_T.

The individual's budget constraint is determined by her wage rate, hours of work, nonlabor nontransfer income, net tax, welfare benefits, and child care expenditures:

$$Y(H, P_T, P_F) =$$
$$wH + N + \sum_{m=T,F} P_m B_m(H, w, \boldsymbol{x}, \boldsymbol{z}) - c - Net\,Tax(H, w, \boldsymbol{x}, \boldsymbol{z}), \tag{4.4}$$

where $B_m(\cdot)$ is the benefit function of program m,

N is nonlabor nontransfer income,

c is the total cost of child care,

w is the wage rate,

$\boldsymbol{x}$ is a vector of personal and family composition characteristics, and

$\boldsymbol{z}$ is a vector of regional characteristics.

It will be assumed that parents file tax returns as heads of their households, claim the standard deduction, and always take up the EITC.

An important feature of my model, not included in the model of Keane and Moffitt (1998), are child care expenditures and subsidies. As mentioned above, child care subsidies are typically not an entitlement, so a modeling strategy different than the one for TANF and FS is needed.

At the time of the work and welfare participation decisions, each mother is aware of whether or not free child care is available from family and friends if she decides to work. Let I_f be an indicator for the availability of free child care. The availability of free child care is assumed to be exogenous, with the probability of an offer of free child care specified as a function of demographic and geographic variables:

$$P(I_f = 1) = \Phi(\boldsymbol{x'_f} \beta_f), \tag{4.5}$$

where $\boldsymbol{x'_f}$ also includes an indicator for whether a grandparent of the child resides in the household and $\Phi(\cdot)$ represents the standard normal cumulative distribution. There is also a chance that the state will provide a subsidy for child care to the family. The subsidy typically does not cover all expenses and requires a copayment by the family. Let I_s be an indicator for the availability of a child care subsidy. The subsidy availability is also treated as exogenous, with the probability that a subsidy is available modeled as

$$P(I_s = 1) = \Phi(X_s'\beta_s) \ . \tag{4.6}$$

In the SIPP, respondents provide information on how much they pay for child care arrangements and whether or not they receive a government child care subsidy. While we observe subsidy receipt and unpaid child care use, we do not observe whether non-recipients were offered a subsidy, or whether non-users of free care had the option of using free care. It is assumed that if the mother decides to work and free or subsidized care is available, then she will always prefer free care to subsidized care. Either of these options is also better than having to pay the full amount.[1] Thus, child care is assumed to be a homogeneous good - care is classified as either paid or unpaid, regardless of who provides it.

Using this information, I specify a child care price equation as:

$$ln\, c = \boldsymbol{x_c'}\beta_c + \gamma_h I(H = H_{full\ time}) - \gamma_s I_s + \epsilon_c, \tag{4.7}$$

where $\boldsymbol{x_c'}$ includes number of children under 6 and 15 years of age and whether a grandparent is in the household. $I(H = H_{full\ time})$ is included since one can reasonably expect that full-time care costs (incurred by full-time workers) are higher. The size of the subsidy is not reported in the data and is estimated through γ_s as a fraction of the cost. If a mother does not work, she cares for the child herself and does not have to pay for care. If a positive number of work hours is chosen and free care or a government subsidy is not available, she has to pay the full cost of care.

[1] In the model, the mode of child care (paid or unpaid) does not have a direct impact on a mother's utility and operates solely through the budget constraint. This model cannot explain single parents who choose not to work and also pay for care. I plan to relax some of these assumptions in future work.

Wage offers are distributed according to

$$ln\, w = \boldsymbol{x'_w}\beta_w + \boldsymbol{z'_w}\gamma_w + \epsilon_w, \tag{4.8}$$

where $\boldsymbol{x'_w}$ is a set of demographic and educational variables, and $\boldsymbol{z'_w}$ represents labor market characteristics.

With three hours choices and two programs, the total number of alternatives available is 12. The optimal choice is the one that gives the highest utility, given the budget constraint, i.e.,

$$choose\ \ alternative\ \ j\ \ if\ \ U_j \geq U_k, k = 1, 2, ..., 12\ . \tag{4.9}$$

The complete choice model consists of (4.2), and (4.3), inserted into (4.1), the budget constraint (4.4) , and the choice rule (4.9).

4.2 Likelihood Function

The estimation sample, discussed in detail below, contains information on the labor supply, child care use, and welfare program participation decisions on a sample of single mothers. With a total of 12 potential choice options, I define the indicators d_{ij} to equal one if individual i is observed to make choice j, and equal to zero if not. I also observe for each employed mother whether she pays for child care ($d_i^c = 1$) or not ($d_i^c = 0$), and if she does, we know whether she received a child care subsidy ($d_i^s = 1$) or not ($d_i^s = 0$).

Let $P(j|\boldsymbol{\theta}, \boldsymbol{x}, I_f, I_s)$ be the probability that hours-participation combination j is optimal, conditional on observable characteristics and parameters of the model and conditional on offer realizations of free and subsidized child care. Further, let $P(j|\boldsymbol{\theta}, \boldsymbol{x}, w, I_f, I_s)$ be the probability of choice j if conditioned on an observed wage offer w, and let $P(j|\boldsymbol{\theta}, \boldsymbol{x}, w, c, I_f, I_s)$ be the probability of choice j, conditional on an observed wage offer and observed child care costs c. Then the log-likelihood function is

$$
\begin{aligned}
L &= \sum_{i\in N}\sum_{j=1}^{12} d_{ij}\, ln \sum_{l=0}^{1}\sum_{k=0}^{1} P(I_F=k)\ P(I_S=l)\ P(j|\boldsymbol{\theta},\boldsymbol{x},I_F=l,I_S=k) \\
&+ \sum_{\substack{i\in E\\ d_i^c=0}}\sum_{j=1}^{12} d_{ij}\, ln\Big\{P(I_f=1)\sum_{k=0}^{1}\ P(I_s=k)\ P(j|\boldsymbol{\theta},x,w,I_f=1,I_s=k)\ \ \phi_1(w)\Big\} \qquad (4.10)\\
&+ \sum_{\substack{i\in E\\ d_i^c=1}}\sum_{j=1}^{12} d_{ij}\, ln\Big\{P(I_f=0)\ P(I_s=d_i^s)\ P(j|\boldsymbol{\theta},\boldsymbol{x},w,c,I_f=0,I_s=d_i^s)\ \phi_2(w,c)\Big\},
\end{aligned}
$$

where $\boldsymbol{\theta}$ is the vector of parameters to be estimated, ϕ_1 and ϕ_2 are the univariate and bivariate standard normal p.d.f. functions, evaluated at the normalized observed errors ϵ_w and ϵ_c, conditional on the observed wage, or an observed wage and observed child care costs, respectively. E and N are the subsets of employed and non-employed individuals in the sample.

Here we only know that a person received an offer of free child care if she is employed and reports $d_i^c = 0$. Further, we only know whether a person received an offer of a child care subsidy if she worked, had nonzero childcare costs ($d_i^c = 1$) and reported receiving a subsidy ($d_i^s = 1$). As noted above, we assume that an offer of free care is always taken up, and a subsidy offer is always taken up if free care is not available.

4.3 Estimation

To estimate the model, I first use the method of Simulated Maximum Likelihood (SML) (Lerman and Manski (1981)) rather than Maximum Likelihood (ML) due to the problems discussed in detail by Keane and Moffitt (1998). ML requires computation of high-order integrals whose limits of integration are practically impossible to determine. In the likelihood function (4.10), the probabilities $P(j|\cdot)$ are replaced by simulators $f(j|\cdot)$: [2]

$$
f(j|\cdot) = \frac{\exp(\frac{U_j}{\rho})}{1+\sum_{k=1}^{12}\exp(\frac{U_k}{\rho})}. \qquad (4.11)
$$

Defining the probabilities as smooth functions of the parameters of the model (as in (4.11))

[2]See Keane and Moffitt(1998).

makes the implementation of gradient optimization methods more practical. The smoothing parameter ρ needs to be normalized.[3] Higher values for ρ imply more smoothing and larger improvement at each iteration (the algorithm will make larger steps because the likelihood is flatter), but induce bias in the obtained estimates. As ρ is gradually reduced to zero, the bias disappears, but a value that is too low causes the probabilities to become step functions of the parameters of the model. This hinders the use of gradient optimization routines. A lot of experimentation with simulated data shows that a good approach is to start with a larger smoothing value and then use the estimates as starting values for estimation with a lower value of ρ.

The simulated log-likelihood is only unbiased as the number of draws goes to infinity, because for a finite number of draws,

$$E\, ln\, f(j|\boldsymbol{\theta}, \boldsymbol{x}) \neq ln\, P(j|\boldsymbol{\theta}, \boldsymbol{x}).$$

For my model, increasing the number of draws beyond 500 changes the estimates and standard errors only marginally. Keane and Moffitt (1998) obtain approximately the same estimates using SML as they do using the Method of Simulated Moments, which achieves consistency for a finite number of random draws. Additionally, the smoothing specified above circumvents the chance of a zero simulated probability, which is greater when trying to evaluate low probabilities and smaller simulation sizes.

However, to further investigate potential biases (including bias induced by the smoothing technique), I also present estimation and simulation results for the model using Donghoon Lee and Kyungchul Song's Consistent Finite Simulation Size Simulated MLE (Lee and Song, 2006), hereafter referred to as the Transformed Simulated Frequency (TSF) estimator.

The estimator is defined as follows:

$$\hat{\theta} = arg\ \max_{\theta} \sum_{i=1}^{n} \sum_{j=1}^{J} d_{ij} \Big\{ - \sum_{s=o}^{R-m_{ij}(\theta)-1} \frac{1}{R-s} + \frac{\nu(m_{i\ -j}(\theta))}{R} \Big\} I\{m_j(\theta) < R\}$$

[3] Here $\rho = 5.0$. This is a fairly low value relative to the utility values of over 300. Lower values of ρ did not result in different estimates.

where m_{ij} represents the number of times individual i has chosen option j, $\nu(m_{i\ -j}(\theta))$ denotes the number of choices other than j that have been chosen at least once by individual i. R is the simulation size and I is an indicator function.

If $m_j/R \rightarrow p$ and $R \rightarrow \infty$ then $\frac{\nu(m_{i\ -j}(\theta))}{R} \leq \frac{J-1}{R} \rightarrow 0$, i.e. the correction to the log probability $log(p) = -\sum_{s=o}^{R-m_{ij}(\theta)-1} \frac{1}{R-s}$ is much more important for smaller simulation sizes.

Chapter 5

Data

The primary data source is the Survey of Income and Program Participation (SIPP). The analysis uses month four from the fourth wave of the 1996 panel and the conveniently corresponding child care topical module. The calendar months covered in this wave include March through June 1997. The core data files of the SIPP contain information on labor force, TANF, and Food Stamp participation, family composition, educational attainment, and various demographic characteristics. The time period in the model is the calendar month, which is also the relevant period for TANF and FS eligibility and benefit recipiency. Federal and state taxes and tax credits are rescaled from the yearly level accordingly.[1]

For workers, hourly wages are constructed as monthly wage and salary earnings divided by the product of number of weeks in the reference month and usual weekly hours for the reference period. Values above \$50 were considered as outliers and excluded.

The child care topical module that was administered in the last month of the fourth wave of the 1996 SIPP panel provides information about child care arrangements for all children under 15 years of age. Information is available about the type of child care arrangements, the care provider, cost of care, weekly hours of care, and where the care was provided. Data cover both formal care (provided by care centers) and informal care (care by relatives, friends, etc.). Respondents are asked if they received financial aid for child care from the government.[2] This information is only available for workers who incurred child care costs.

[1] The earnings, labor force, and program participation data are at a monthly level. The model implicitly assumes that the monthly choice reflects the annual choice that determines EITC

[2] The size of the subsidy itself is not reported and is estimated.

I use state-specific TANF rules to compute benefits used in the analysis. In the cases in which the formula also varies within state, I apply the formula relevant to the majority of the caseload for the relevant period.[3] The formulas are complex but there is relatively little interaction between them and the formulas for the EITC and Food Stamps. The EITC only takes into account earned income and its provisions explicitly state that it cannot be counted as income for the purposes of TANF and Food Stamps.[4] Most notably, TANF benefits are treated as income for Food Stamp benefit computation purposes. TANF and FS eligibility requirements involve the value of the family's assets. Data on assets were extracted from the topical module of the third wave of the 1996 SIPP.

Interview month four of the fourth wave of the core data files from SIPP 1996 and the corresponding child care topical module contain 86,173 individual observations. I do not use 958 of the observations because the state is not uniquely identified.[5] Of the remaining records, 3,253 belonged to women who were heads of single-headed families. The final sample consists of 3,060 single mothers with at least one child under the age of 15 after dropping women over the age of 60 (88 observations), observations for which participation in TANF or Food Stamps was imputed (86), and observations for which weekly work hours were allocated (19), in that order.[6] I treated imputed wages and child care costs as randomly missing and modified the likelihood function accordingly. Full-time work is defined as working at least 35 hours per week. Part-time covers those who worked 1-34 hours per week. Descriptive statistics on key demographic variables are presented in Table 5.2. The mothers are on average 34 years old, have 1.7 children under 15, and have a high school education.

As can be seen in Table 5.1, more than 16 percent of the sample work part time and 48.5 percent work full time. Overall, more than half of the single mothers who participate in either TANF or the FS program, participate in both. As expected, non-workers are more

[3]For confidentiality reasons, geographical information in the SIPP only identifies states and large metropolitan areas.

[4]Several states specify that TANF activities sanctions also affect receipts or benefits of Food Stamps.

[5]The states of Maine and Vermont share one state code. So do North Dakota, South Dakota, and Wyoming.

[6]I used logical allocations but not observations for which a hot-deck or cold-deck allocation procedure was applied.

likely to participate in welfare programs - almost two-thirds of them participate in at least one program, compared to 39 percent for part-time and 10 percent for full-time workers. This is consistent with eligibility restrictions (income increases with hours of work). Regardless of the work choice, Food Stamp participation is more likely than TANF participation.

Table 5.1: Actual probabilities for work/program participation choices in the data

	Nonworkers	Part-time	Full-time	(total)
FS=0,TANF=0	13.3%	10.1%	43.4%	66.8%
FS=1,TANF=0	5.5%	3.2%	3.4%	12.1%
FS=0,TANF=1	1.1%	0.3%	0.5%	1.9%
FS=1,TANF=1	15.0%	2.9%	1.2%	19.1%
(total)	34.9%	16.5%	48.5%	100.0%

Table 5.2: Descriptive Statistics and Budget Constraint Variables

Variable	Mean	Std. Dev.	Min	Max
Age	33.53	8.75	15	60
South	0.39	0.49	0	1
White	0.62	0.49	0	1
No.Children under 6	0.65	0.77	0	5
No.Children under 15	1.68	0.94	1	8
Years of education	12.12	2.50	0	21
Metropolitan Statistical Area	0.57	0.49	0	1
Average age of children	7.14	4.08	0	14
Size of Household	3.70	1.49	2	13
Grandparent of child in household	0.13	0.33	0	1
Child of at least age 12 in family	0.30	0.46	0	1
Total weekly child care costs if positive	111.26	94.08	2	700
Average hourly wage for workers	10.87	6.38	3	49
Average weekly hours (part-time)	25.61	10.84	0	72
Average weekly hours(full-time)	40.47	6.27	0	99
TANF for nonworkers	90.02	46.54	0	282.18
TANF for part-time workers	24.84	35.01	0	258.15
TANF for full-time workers	2.98	12.63	0	231.61
FS for nonworkers	72.13	27.70	0	201.5
FS for part-time workers	38.90	27.87	0	195.39
FS for full-time workers	7.07	16.12	16.12	182.05
Federal Tax for part-time workers	5.82	16.66	0	302.85
Federal Tax for full-time workers	42.79	44.41	0	553.23
State Tax for part-time workers	2.27	4.94	0	103.39
State Tax for full-time workers	10.93	13.13	0	193.53
Federal EITC for part-time workers	42.55	15.70	0	70.30
Federal EITC for full-time workers	26.85	22.67	0	70.30
State EITC for part-time workers	1.33	4.08	0	30.23
State EITC for full-time workers	0.74	2.88	0	30.23
Net Tax for part-time workers	-35.78	30.42	-94.21	401.08
Net Tax for full-time workers	26.13	73.26	-94.12	745.77

Note: All budget constraint variables except the wage are at the weekly level

Chapter 6

Results and Policy Simulations

6.1 Results

The estimates of the model parameters are provided in table 6.2. Most of the parameters have the sign and magnitude as expected from previous research. Children are associated with lower preferences for work and higher preferences for participating in welfare programs. Older, white mothers with higher levels of education have lower disutility of work. As expected, wages are higher for older white women, who do not live in the South. Costs of welfare participation are higher for older, white, and better educated mothers.

Families with more children, in which the parent works, tend to incur higher child care costs. If available, government-provided subsidies reduce child care costs by 79 percent.[1]

The number of young children in the family has a strong positive effect on the probability of paying for care if the mother works, which could indirectly reflect preferences of mothers towards caring for their young children, or, alternatively, that supply of free care is lower for younger children. In addition, the availability of free care is more likely in larger households, which is consistent with care by grandparents or siblings. The probability of receiving a child care subsidy by the government is lower for white female heads of households in the South. Having an extra 1000 dollars in assets lowers the probability of a subsidy by approximately 2 percentage points.

The utility function parameters jointly determine the elasticities of hours worked with respect to the wage, total income, and the price of child care, which are reported in Table 6.2.

[1] If a subsidy is available, the family pays only a fraction ($\frac{1}{exp(1.56)}$) of the cost.

The uncompensated wage elasticity is 0.38, which is a reasonable value for single mothers. The price of child care elasticities of hours worked and employment are -0.24 and -0.25, respectively, and are on the low end of previous estimates. The assumption that free care is always preferred to a partially subsidized child care arrangement contributes to this low estimate, since about half of the sample are estimated to have access to free care and would not take up the subsidy.

The fit of the choice probabilities is reasonably good. The actual and fitted frequencies of choices in the sample are presented in Tables 5.1 and 6.3. The model tends to overpredict part-time workers at the expense of non-workers. The Pearson Chi-Squared measure of goodness of fit in is 109.7 with a critical value of 19.68 at a confidence level of 5 percent. Most notably, the estimates of all low-frequency cells are very good.

6.2 Policy Simulations

In this section I use the estimates from the model to simulate the labor supply and welfare participation decision responses of the sample to several alternative policy reforms. The idea is to consider policy changes in different programs that result in the same level of cost to the government, and compare the changes in employment and welfare outcomes. The baseline simulated outcomes are in the first column of Table 6.6. The non-employed comprise 35.1% of the sample, 18.2% of the sample participate in TANF, 29.1% participate in the Food Stamp program, and 53.3% are in poverty.[2] At the 1997 policy parameter values, the weekly, average, net transfer per family is estimated at $69.5. It is the sum of the welfare benefits, tax credits, child care, and wage subsidies (to be included in the analysis below), less the tax that the family pays to the government.

To provide a benchmark against which to assess the magnitude of the policy changes that I simulate, consider the EITC expansion from 1993 to 1997. The simulated results from changing the EITC parameters back to their 1993 values are given in the second column

[2] See the Federal Guidelines in Table 6.9.

of Table 6.6. Net transfers decrease by 14.5%, non-employment goes up by 3.4 percentage points, and the poverty rate increases by 4.5 percentage points. The direction and magnitude of these effects are consistent with previous work. (see, for example, Meyer and Rosenbaum 2000).

The first reform I examine makes the EITC more generous (column 3).[3] This has effects on employment (an increase of 3.9 percentage points) and the poverty rate (a reduction of 5.1 percentage points) similar to those of the expansion of the EITC from 1993 to 1996. The resulting net transfer increases to $84.8 per week. The remaining policy simulations are all calibrated to yield the same net transfer of $84.8. In columns four through eight I simulate responses to (4) a guaranteed minimum wage rate, (5) a universal wage subsidy, (6) a reduction in the TANF implicit marginal tax rate, (7) an increase in the availability of child care subsidies, and (8) implementation of a child care subsidy distribution scheme similar to the one in the United Kingdom.[4]

Column (4) presents results for the implementation of a guaranteed minimum wage at $8.40. Here the government provides an hourly subsidy equal to the difference between the offered wage and the minimum guaranteed amount. Setting the guarantee at $8.91 yields the benchmark net transfer of $84.8 per week. This policy has a strong effect on employment of 5.5 percentage points; reduction of poverty and the overall increase in welfare come mainly from the part of the sample that was poor at the baseline. In all of these respects, the guaranteed minimum rate performs better than the EITC for the same cost to the government. It should be noted that I assume no stigma effects associated with wage subsidies; these effects are not identified in the absence of such subsidies. Implicitly, it is also assumed that the wage subsidy programs do not cause changes in the wage offer distributions.

The interpretation of the result in column (4) is that this type of earnings subsidy better targets low-wage workers. The EITC amount is only determined by the taxpayer's total

[3] The phase-in and phase-out rates were increased to 0.6 and 0.3, respectively, regardless of the family size, while keeping the phase-in and phase-out ranges the same. For a family with two qualifying children, this results in a maximum benefit of $5,484. The benefits completely phase out at a yearly earnings level of $30,210.

[4] In the United Kingdom, the child care subsidy is given as a part of the EITC and is an entitlement. Recipients must work at least sixteen hours per week. Family caps are imposed on the maximum child care subsidy.

earnings and does not take into account the hourly earnings. For example, a part-time working mother with two children and an hourly wage of $12 will be eligible for exactly the same amount (the maximum credit of $3,656) as a full-time working mother at $6 per hour. Given that the average observed wage in the sample is less than $11, the credit allocated to the higher-wage worker is probably hard to justify, since she could increase her family's income by simply working more (under the 1997 EITC schedule, she would be eligible for $1,000 even if she started working full-time). If one is concerned about non-employment rates and welfare of the poor, the wage subsidy would be more efficient. The attractiveness, on the other hand, of having an EITC schedule that only involves total earnings is that it is very simple and implies relatively low administrative costs.

The universal wage subsidy of $0.73 in column (5) is less effective than the subsidized wage in column (4) since it also subsidizes workers with higher wages, who, from a policy perspective, do not "need" the aid.

The reduction in the TANF marginal tax rate in column (6) to 41.5% (from close to 100%) causes an insignificant increase in employment but slightly increases the probabilities of participation in TANF and Food Stamps. This result is consistent with the results discussed in Moffitt (1992) and Keane and Moffitt (1998). Reducing the marginal tax rate makes individuals with higher incomes eligible (or almost eligible) and some of them will choose to decrease their labor supply. From the transition probabilities in Table 6.6 it is evident that more than half of the decrease in non-employment is offset by workers reducing their hours of work. The reduction in the poverty rate is negligible and so is the change in the measure of welfare, both for workers and non-workers, from the baseline results.

Column (7) provides the simulated responses to increasing the availability of child care subsidies. The outcomes are very similar to those for the EITC reform. In column (8), the child care subsidy is made available to all working mothers. The subsidy rate is lower, and caps on the maximum amounts are imposed.[5] By redistributing funds in this fashion, the heads of a larger number of poor families get access to subsidized care and move into the

[5] This is very similar to the child care subsidy implemented in the UK. The subsidy rate here is $65 with caps of $100 for a family of two, and $150 for larger families. It should be noted, that according to the model, if free care is available, it will be used, so the subsidy would not be taken up in this case.

labor force - the fraction non-employed is similar to the case with a minimum wage subsidy at roughly five percentage points below the baseline estimated rate.

An interesting issue regarding TANF and Food Stamps is, to what extent the benefits are able to reach their intended recipients. In the model, there is a trade-off between receiving welfare benefits and incurring participation costs. Individuals, for which the costs are too high relative to the benefit, choose not to participate. If the welfare program becomes more generous, then we should see an increase in recipiency of TANF and Food Stamps. Table 6.10 illustrates the effect of increasing welfare benefits on participation. Increasing the TANF the maximum benefit by 50 and 100 lead to very humble increases in participation, and especially in take-up rates among eligible families. Participation and take-up are significantly more responsive when the same parameter for the Food Stamp program is modified in the same fashion, indicating lower participation costs for Food Stamps.

Another relevant issue is the accuracy of benefit imputation from the TANF and FS formulas I use. It could be argued that even if the budget constraint is highly inaccurate, the flexible utility function of the model would still be able to provide a reasonably good fit of the discrete choice model. Table 6.2 provides a comparison of the average predicted and imputed benefits for the individuals who reported collecting benefits and I classified as eligible for positive benefits. The TANF predicted benefits are on average 52 dollars higher than those reported, at 417 dollars. The FS average difference, on the other hand, is smaller at 8 dollars. Distributions of the TANF and FS differences on figures 6.2 and **??** show that most individuals have a reasonably good knowledge of the size of their benefits. There are also some obvious misreportings, more notably for TANF, where the reported amount was higher than the maximum possible for the corresponding state.

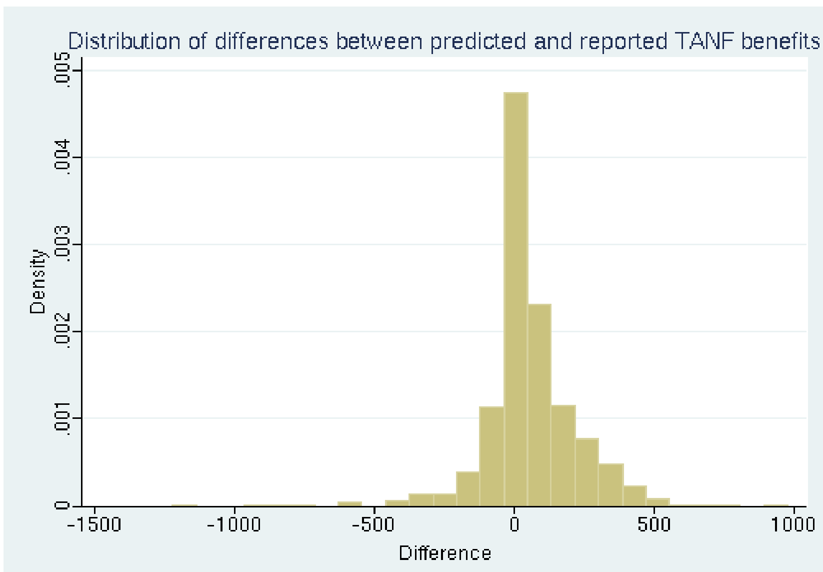
6.3 TSF Results and comparisons

Table 6.4 presents estimation results from the TSF estimation with 500 draws. The results are very similar to those using the Lerman-Manski smoothed SML. The effects of children on work and welfare participation probabilities have the same magnitude and direction. The

Table 6.1: Reported and imputed TANF and FS monthly benefits

	Mean	St. Dev.
Reported TANF benefit	365.14	202.02
Imputed TANF benefit	417.35	172.95
Difference	52.22	174.34
Reported FS benefit	223.77	107.35
Imputed FS benefit	231.88	90.36
Difference	8.11	96.58

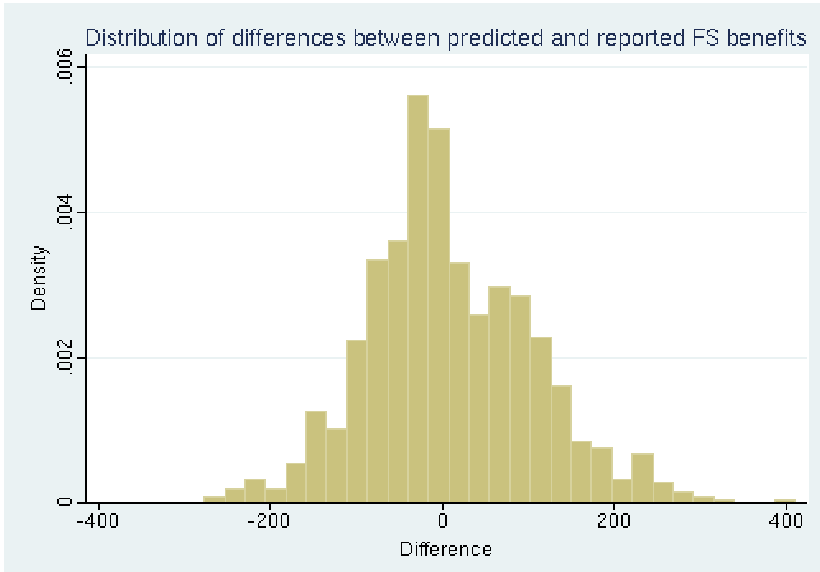
Figure 6.1: TANF benefit computation



estimated size of the child care subsidy is almost identical when using either method. Notably, the estimated elasticities are comparable at 0.35 and -0.27 for wage and child care cost elasticities, respectively. This is a good indicator that policy simulation results will not be sensitive to the estimation technique, which I investigate further by comparing the results in the already discussed table 6.6 and table 6.7. The estimated average per family weekly transfer to families is almost identical, and so is the effect of the simulated EITC expansion on transfers and employment in columns (3). In addition, the ranking of policies by their effectiveness is fully preserved. The guaranteed wage rate and modified child care subsidy in column (8) still perform best. The EITC and the child care subsdies have similar effects.

Table 6.8 provides a comparison of key results from the smoothed Lerman-Manski estimator and the TSF estimator for various simulation sizes. Consistently with the results from the

Figure 6.2: FS benefit computation



Monte Carlo study of Lee and Song (2006), the TSF estimator seems to have an advantage when using smaller simulation sizes in terms of its ability to fit the discrete choices. The Pearson Chi-Squared goodness of fit has a lower value for the TSF at for small number of draws. We observe that the esimated wage and price of child care elasticities converge as the simulation size increases and are very close when a simulation size of 500 is used. Further increases in the simulation size did not result in significant changes in estimates. Similarly, the estimated average weekly per family government transfer gradually stabilizes with the increase in the simulation size and is very similar at about $70 for the two estimators.

From a practical point of view, even though the TSF estimator seems to have an advantage for small values of R, it generally required longer estimation times since the estimator is not a smooth function of its parameters and necessitates a non-gradient numerical optimization routine [6]. Exact perfomance comparisons would be difficult since the number of function evaluations required by the two methods are different. In addition, parallel proccessing effectivenes will be different for these optimization techniques, and will also depend on the complexity of the model.

[6] I used Nelder-Mead, or downhill simplex method

Table 6.2: Simulated Maximum Likelihood Results: Lerman-Manski SML

	Tastes for work	Log wage	TANF costs	FS costs	Log Child Care Costs	P(Free care)	P(Subsidy)
Constant	-2.94	-1.48*	-108.9	-27.97	5.3	-0.08	-2.19
	(1.87)	(0.07)	(36.45)	(18.16)	(0.21)	(0.21)	(0.53)
Age	4.1	4.64**	-0.22	-0.56			
	(2.57)	(0.11)	(0.47)	(0.3)			
South	1.47	-0.1**	-55.54	-6.69	0.01	0.13	-0.4
	(0.58)	(0.01)	(15.04)	(5.03)	(0.11)	(0.06)	(0.17)
White	1.19	1.8*	-43.43	-25.13	-0.15	-0.15	-0.24
	(0.54)	(1.38)	(10.26)	(5.89)	(0.12)	(0.06)	(0.15)
No. of children under 15	-0.88		25.82	11.97	-0.05	-0.06	0.13
	(0.31)		(7.56)	(4.82)	(0.07)	(0.04)	(0.08)
No. of children under 6	0.25		12.61	-3.85	0.31	-0.52	0.28
	(0.39)		(6.83)	(3.72)	(0.08)	(0.04)	(0.09)
Years of education	0.47	1.02	-6.81	-2.22	-0.09	0.02	0.05
	(0.1)	(0.03)	(2.35)	(1.13)	(0.02)	(0.01)	(0.04)
Age squared		-4.39****					
		(0.09)					
State unemployment		0.01					
		(0)					
TANF average adm expenses			-2.38				
			(0.84)				
TANF full sanction			18.37				
			(11.97)				
TANF work exemption - age of child in months			0.52				
			(0.35)				
No. of categories satisfying work requirements			-0.4				
			(0.95)				
Household size					0.23	0.06	
					(0.04)	(0.02)	
Child Care Subsidy					-1.56		
					(0.22)		
Full-time work					0.37		
					(0.02)		
Assets (thousands)							-0.13
							(0.10)

Notes: *=divided by 10; **=divided by 100; ****=divided by 10000

Table 6.2 continued

Utility Parameters

$\beta_{HH} * 100$	-23.5		δ_T	-1.21
	(3.36)			(0.59)
$\beta_{YY} * 10000$	-11.93		δ_F	-0.27
	(1.34)			(0.34)
ψ_{TF}	109.24		$\eta_T * 100$	-3.55
	(18.55)			(4.51)
$\beta_{HY} * 1000$	24.44		$\eta_F * 100$	-7.62
	(4.09)			(3.48)

Error Standard Deviations

ϵ_α	ϵ_w	ϵ_T	ϵ_F	ϵ_c
8.08	0.46	139.85	77.10	1.47
(0.89)	(0.005)	(20.61)	(9.74)	(0.13)

Error Correlations

	ϵ_α	ϵ_w	ϵ_T	ϵ_F
ϵ_w	0.58			
	(0.02)			
ϵ_T	-0.19	-0.36		
	(0.01)	(0.01)		
ϵ_F	-0.10	0.34	0.17	
	(0.02)	(0.02)	(0.02)	
ϵ_c	0.88	0.20	-0.10	-0.09
	(0.01)	(0.02)	(0.04)	(0.03)

Elasticities

w	0.38
c ($hours$)	-0.24
c ($work$)	-0.25

Table 6.3: Fitted probabilities for work/program participation choices - Lerman-Manski SML

	Nonworkers	Part-time	Full-time	(total)
FS=0,TANF=0	10.1%	13.1%	46.2%	69.4%
FS=1,TANF=0	6.5%	3.5%	2.4%	12.4%
FS=0,TANF=1	0.9%	0.2%	0.5%	1.6%
FS=1,TANF=1	11.8%	3.4%	1.5%	16.7%
(total)	29.2%	20.3%	50.5%	100.0%

Table 6.4: Modified Simulated Maximum Likelihood Results: TSF

	Tastes for work	Log wage	TANF costs	FS costs	Log Child Care Costs	P(Free care)	P(Subsidy)
Constant	-0.90	-1.35*	-197.32	-45.53	4.92	0.05	-2.02
	(0.21)	(0.34)	(0.14)	(0.24)	(0.02)	(4.64)	(0.10)
Age	2.16	4.47**	0.49	-0.51			
	(0.32)	(0.05)	(0.50)	(0.38)			
South	1.38	-0.1**	-94.17	-4.06	0.16	0.06	-0.47
	(0.33)	(0.55)	(0.29)	(0.73)	(0.64)	(1.28)	(0.31)
White	1.33	5.48*	-59.35	-29.06	0.02	-0.15	-0.29
	(0.27)	(0.61)	(0.31)	(0.31)	(1.67)	(0.44)	(0.49)
No. of children under 15	-2.00		45.28	16.90	-0.04	-0.06	0.13
	(0.13)		(0.20)	(0.19)	(1.11)	(0.75)	(0.57)
No. of children under 6	0.83		11.22	-6.04	0.27	-0.5	0.22
	(0.34)		(0.49)	(0.55)	(0.21)	(0.07)	(0.44)
Years of education	0.54	1.00*	-4.79	-2.40	-0.06	0.01	0.04
	(0.13)	(0.05)	(0.31)	(0.37)		(0.97)	(0.60)
Age squared		-3.88****					
		(0.07)					
State unemployment		0.005					
		(0.84)					
TANF average adm expenses			-2.50				
			(0.43)				
TANF full sanction			26.88				
			(0.48)				
TANF work exemption - age of child in months			0.88				
			(0.42)				
No. of categories satisfying work requirements			-0.75				
			(0.72)				
Household size					0.20	0.06	
					(0.15)	(0.56)	
Child Care Subsidy					-1.49		
					(0.78)		
Full-time work					0.85		
					(0.20)		
Assets (thousands)							-0.12
							(0.72)

Notes: *=divided by 10; **=divided by 100; ****=divided by 10000

Table 6.4 continued

Utility Parameters

$\beta_{HH} * 100$	-23.19	δ_T	-4.47
	(0.06)		(0.27)
$\beta_{YY} * 10000$	-12.77	δ_F	0.16
	(0.08)		(0.45)
ψ_{TF}	165.72	$\eta_T * 100$	-9.74
	(0.13)		(0.39)
$\beta_{HY} * 1000$	25.92	$\eta_F * 100$	-13.38
	(0.13)		(0.29)

Error Standard Deviations

ϵ_α	ϵ_w	ϵ_T	ϵ_F	ϵ_c
7.75	0.96	231.30	88.36	1.92
(0.01)	(0.10)	(0.20)	(0.10)	(0.60)

Error Correlations

	ϵ_α	ϵ_w	ϵ_T	ϵ_F
ϵ_w	0.82			
	(0.01)			
ϵ_T	0.086	0.065		
	(0.03)	(0.10)		
ϵ_F	-0.157	-0.077	-0.012	
	(0.03)	(0.05)	(0.12)	
ϵ_c	0.969	0.701	-0.046	-0.125
	(0.02)	(0.04)	(0.06)	(0.12)

Elasticities

w	0.35
c ($hours$)	-0.27
c ($work$)	-0.27

Table 6.5: Fitted probabilities for work/program participation choices - TSF

	Nonworkers	Part-time	Full-time	(total)
FS=0,TANF=0	10.5%	15.9%	38.2%	64.6%
FS=1,TANF=0	5.2%	5.0%	3.2%	13.4%
FS=0,TANF=1	1.3%	0.3%	0.3%	1.9%
FS=1,TANF=1	14.9%	4.1%	1.1%	20.1%
(total)	31.9%	25.3%	42.8%	100.0%

Table 6.6: Policy Simulations - Lerman-Manski SML

	1	2	3	4	5	6	7	8
p(no work)	0.292	0.326	0.253	0.237	0.27	0.281	0.251	0.222
	(0.007)	(0.008)	(0.007)	(0.007)	(0.008)	(0.007)	(0.007)	(0.007)
p(part-time)	0.203	0.175	0.241	0.214	0.185	0.217	0.211	0.22
	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
p(full-time)	0.505	0.498	0.507	0.548	0.545	0.502	0.537	0.558
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)
p(tanf)	0.182	0.19	0.172	0.158	0.174	0.206	0.171	0.167
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
p(fs)	0.291	0.304	0.275	0.242	0.275	0.301	0.274	0.266
	(0.008)	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)
below poverty	0.533	0.578	0.482	0.456	0.482	0.517	0.493	0.48
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
av. Utility	312.162	297.506	330.526	340.547	332.227	315.242	329.258	340.287
	(4.518)	(4.447)	(4.589)	(4.738)	(4.672)	(4.519)	(4.69)	(4.558)
av utility, poor	143.349	129.626	162.184	178.744	158.006	147.987	171.647	188.728
	(4.971)	(4.688)	(5.368)	(5.687)	(5.4)	(4.979)	(5.844)	(5.992)
av utility, non-poor	504.485	488.767	522.314	524.883	530.711	505.789	508.82	512.954
	(10.945)	(10.704)	(11.212)	(11.412)	(11.352)	(10.982)	(11.025)	(10.987)
Transition Probabilities								
0 → 20	0	0	0.038	0.048	0.02	0.012	0.025	0.062
	(0)	(0)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.004)
0 → 40	0	0.002	0.006	0.018	0.014	0.001	0.02	0.03
	(0)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.003)	(0.003)
20 → 0	0	0.033	0	0	0	0.001	0	0.007
	(0)	(0.003)	(0)	(0)	(0)	(0)	(0)	(0.001)
20 → 40	0	0.002	0.003	0.006	0.006	0	0.003	0.007
	(0)	(0.001)	(0.001)	(0.001)	(0.001)	(0)	(0.001)	(0.001)
40 → 0	0	0.002	0	0	0	0	0	0.001
	(0)	(0.001)	(0)	(0)	(0)	(0)	(0)	(0.001)
40 → 20	0	0.013	0.015	0.001	0	0.006	0	0.005
	(0)	(0.002)	(0.002)	(0)	(0)	(0.001)	(0)	(0.001)
no change in hours	1	0.949	0.939	0.927	0.959	0.98	0.951	0.888
	(0)	(0.004)	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)	(0.005)
poverty→non-poverty	0	0.002	0.054	0.078	0.051	0.016	0.039	0.062
	(0)	(0.001)	(0.004)	(0.004)	(0.004)	(0.002)	(0.004)	(0.005)
non-poverty→poverty	0	0.048	0.004	0.001	0.001	0.001	0	0.009
	(0)	(0.004)	(0.001)	(0)	(0)	(0)	(0)	(0.002)
av. weekly transfer	69.5	59.4	84.8	84.8	84.8	84.8	84.8	84.8
av. weekly tanf amt	32.5	35.2	29.6	25.7	30.6	46.8	29.2	27.6
av. weekly fs amt	32.4	33.7	31.1	25.1	30.8	32.2	30.3	29.2
av. weekly federal tax amt	21.5	21.6	21.2	25.4	22.3	21.4	22.1	22.7
av. weekly state tax amt	5.8	5.7	5.7	6.7	6	5.7	5.9	6.1
av. weekly federal EITC	22.8	9.7	40.9	23.9	23.4	23.4	24.5	25.5
av. weekly state EITC	0.7	0.3	1.2	0.8	0.7	0.7	0.7	0.8
av. weekly net tax	3.8	17.3	-15.2	7.4	4.1	3.1	2.8	2.5
av. weekly wage subsidies	0	0	0	32	18.6	0	0	0
av. weekly child care subsidies	8.4	7.8	9	9.4	8.9	8.9	28.2	30.5

1 estimated
2. 1993 EITC parameters
3. EITC expansion
4. Guaranteed minimum wage rate = 8.91
5. Universal hourly wage subsidy =0.73
6. TANF implicit tax decrease to 0.415
7. Increase of availability of child care subsidies to 0.30
8. Universal child care, lower subsidy rate =0.44

Table 6.7: Policy Simulations - TSF

	1	2	3	4	5	6	7	8
p(no work)	0.319	0.351	0.281	0.262	0.298	0.31	0.29	0.253
	(0.008)	(0.008)	(0.007)	(0.007)	(0.008)	(0.008)	(0.007)	(0.007)
p(part-time)	0.253	0.226	0.288	0.28	0.249	0.263	0.252	0.273
	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
p(full-time)	0.428	0.423	0.431	0.459	0.453	0.426	0.457	0.474
	(0.008)	(0.007)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
p(tanf)	0.22	0.229	0.209	0.197	0.212	0.23	0.211	0.205
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)
p(fs)	0.335	0.348	0.321	0.293	0.324	0.339	0.324	0.319
	(0.008)	(0.008)	(0.009)	(0.008)	(0.008)	(0.008)	(0.008)	(0.009)
below poverty	0.578	0.615	0.533	0.511	0.542	0.567	0.553	0.545
	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)	(0.008)
av. Utility	339.938	326.98	356.806	366.363	355.308	342.009	352.614	364.259
	(4.27)	(4.234)	(4.35)	(4.478)	(4.362)	(4.27)	(4.397)	(4.257)
av utility, poor	184.282	171.635	201.885	217.423	195.501	187.354	204.63	222.877
	(5.595)	(5.291)	(5.909)	(6.556)	(5.885)	(5.61)	(5.909)	(6.229)
av utility, non-poor	552.953	539.569	568.815	570.186	574.003	553.654	555.129	557.74
	(12.964)	(12.698)	(13.254)	(13.341)	(13.306)	(12.985)	(12.997)	(12.911)
			Transition Probabilities					
0 → 20	0	0	0.037	0.054	0.02	0.009	0.021	0.073
	(0)	(0)	(0.004)	(0.004)	(0.002)	(0.002)	(0.003)	(0.005)
0 → 40	0	0.002	0.004	0.012	0.009	0	0.015	0.019
	(0)	(0.001)	(0.001)	(0.002)	(0.002)	(0)	(0.002)	(0.003)
20 → 0	0	0.032	0	0	0	0.001	0	0.008
	(0)	(0.003)	(0)	(0)	(0)	(0.001)	(0)	(0.002)
20 → 40	0	0.001	0.003	0.007	0.006	0	0.005	0.012
	(0)	(0.001)	(0.001)	(0.002)	(0.001)	(0)	(0.001)	(0.002)
40 → 0	0	0	0	0	0	0	0	0.001
	(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
40 → 20	0	0.01	0.009	0	0.001	0.003	0	0.01
	(0)	(0.002)	(0.002)	(0)	(0)	(0.001)	(0)	(0.002)
no change in hours	1	0.955	0.947	0.927	0.964	0.987	0.959	0.879
	(0)	(0.004)	(0.004)	(0.004)	(0.003)	(0.002)	(0.004)	(0.006)
poverty→non-poverty	0	0.001	0.045	0.067	0.037	0.011	0.025	0.042
	(0)	(0.001)	(0.004)	(0.005)	(0.003)	(0.002)	(0.003)	(0.004)
non-poverty→poverty	0	0.038	0.001	0	0	0.001	0	0.009
	(0)	(0.003)	(0)	(0)	(0)	(0)	(0)	(0.002)
av. weekly transfer	68.6	59.7	82.3	82.3	82.3	82.3	82.3	82.3
av. weekly tanf amt	35.6	37.9	33	28.2	34.1	48.8	33.4	31.8
av. weekly fs amt	35.2	36.4	34	28.3	34.1	35.1	33.7	32.8
av. weekly federal tax amt	26	26	25.8	28.6	26.4	25.9	26.7	27.7
av. weekly state tax amt	6.6	6.6	6.6	7.2	6.7	6.6	6.8	7
av. weekly federal EITC	20.6	9.2	37	23.5	21.3	21	21.5	22.4
av. weekly state EITC	0.6	0.3	1.1	0.7	0.7	0.7	0.7	0.7
av. weekly net tax	11.2	23.1	-5.7	11.7	11.2	10.8	11.4	11.6
av. weekly wage subsidies	0	0	0	27.2	15.6	0	0	0
av. weekly child care subsidies	9.1	8.5	9.6	10.1	9.7	9.3	26.6	29.3

1 estimated
2. 1993 EITC parameters
3. EITC expansion
4. Guaranteed minimum wage rate =8.25
5. Universal hourly wage subsidy = 0.67
6. TANF implicit tax decrease to 0.476
7. Increase of availability of child care subsidies = 0.24
8. Universal child care, lower subsidy rate = 0.38

Table 6.8: Fit, elasticities, and cost comparison for different simulation sizes

Smoothed

	2 draws	5 draws	10 draws	20 draws	50 draws	100 draws	200 draws	500 draws
Chi-Squared	1163.0	643.9	256.7	773.5	159.9	176.0	134.1	109.7
Average Transfer	126.6	128.5	91.7	82.6	82.4	77.4	71.4	69.5
Wage elasticity	0.17	0.35	0.21	0.23	0.27	0.32	0.36	0.38
Child Care Elasticity - hours	-0.20	-0.41	-0.16	-0.17	-0.15	-0.23	-0.29	-0.24
Child Care Elasticity - work	-0.23	-0.41	-0.16	-0.18	-0.15	-0.23	-0.30	-0.25

TFS

	2 draws	5 draws	10 draws	20 draws	50 draws	100 draws	200 draws	500 draws
Chi-Squared	525.8	427.0	274.3	197.1	286.9	290.3	308.7	148.4
Average Transfer	53.0	57.0	63.6	70.0	57.2	70.1	84.2	68.6
Wage elasticity	0.29	0.32	0.37	0.34	0.26	0.32	0.32	0.35
Child Care Elasticity - hours	-0.12	-0.17	-0.18	-0.21	-0.19	-0.22	-0.27	-0.27
Child Care Elasticity - work	-0.11	-0.16	-0.17	-0.20	-0.18	-0.27	-0.27	-0.27

Table 6.9: 1997 HHS Poverty Guidelines

Size of family unit	48 Contiguous States + DC	Alaska	Hawaii
1	7,890	9,870	9,070
2	10,610	13,270	12,200
3	13,330	16,670	15,330
4	16,050	20,070	18,460
5	18,770	23,470	21,590
6	21,490	26,870	24,720
7	24,210	30,270	27,850
8	26,930	33,670	30,980

Source: Federal Register, Vol. 62, No. 46, March 10, 1997, pp. 10856-10859

Table 6.10: Welfare Participation Responses to Increases in the Maximum Benefit

	Actual Level	Changes in TANF		Changes in FS	
		150%	200%	150%	200%
TANF participation (eligibles)	0.39	0.40	0.43	0.38	0.37
FS participation (eligibles)	0.47	0.48	0.49	0.59	0.70
TANF participation (all)	0.18	0.21	0.24	0.19	0.18
FS participation (all)	0.29	0.30	0.30	0.37	0.43
Av. weekly transfer	69.5	89.5	111.7	91.9	115.1

Chapter 7

Conclusions

7.1 Conclusions

In this paper I have estimated a structural model of labor supply and multiple program participation in order to compare the relative effectiveness of welfare, wage subsidy, and child care subsidy programs in inducing employment and reducing poverty among single mothers in the 1997 SIPP. I have also applied Donghoon Lee's TSF esimator (Lee and Song, 2006) to my discrete choice model and compared the results from the two different estimation techniques.

I stress several main findings. First, I find that a targeted wage subsidy is an attractive way to encourage employment, increase well-being of the poor, and reduce welfare caseloads. The results indicate that the positive effects of the Earned Income Tax Credit in the 1990s could have been achieved at a lower cost. This is an interesting implication of the model and should be explored in future research in more detail. Second, I confirm that the EITC contributed to the increased employment of single mothers in the 1990s, which is consistent with most of the EITC literature (Eissa and Liebman 1996; Meyer and Rosenbaum 2000). The credit is effective in reducing poverty, but not as effective in increasing labor supply as certain types of wage and child care subsidies. Third, only extreme reductions in the implicit marginal tax rates of welfare programs have sizable labor supply effects, and they are very expensive. Fourth, the current child care subsidy scheme is comparable to the EITC in terms of its effects on employment and would be more effective if the subsidy became slightly less generous but available to more single mothers. Fifth, I confirm that the TSF estimator is able to fit the discrete choice model better for smaller simulations sizes. However, this advantage is outweighed by the need to use a slower optimization routine.

My findings also suggest that means testing is not an optimal eligibility test for benefits since it creates work disincentives for workers in certain parts of the earnings distribution (e.g., workers with earnings just above the phase-out region of the EITC). Instead, eligibility can be based on hourly wages. While this would be difficult to implement in welfare programs, it should be feasible for hourly wage subsidies since a wage would be observed for all who work. The total amount of the subsidy would only increase with hours worked and not create work disincentives (the positive estimated elasticities from the model suggest that labor supply of workers in the sample is not backward bending).

A limitation of the model in this paper is that it does not allow for preferences with respect to child care arrangements. This is important since child care quality varies significantly and is a determinant of child outcomes. It would be preferable to endogenize child care choices. This extended model would explain non-workers paying for care, as well as workers not reporting any type of child care arrangement.

Bibliography

[1] Anderson, P. and P. Levine "Child Care and Mothers' Employment Decisions" in *Finding Jobs: Work and Welfare Reform.* New York: Russel Sage Foundation. (2000).

[2] Blau, D. "Child Care Subsidy Programs" *Means-Tested Transfers in the U.S., ed. R. Moffitt* , (2003).

[3] Blau, D. and E. Tekin "The Determinants and Consequences of Child Care Subsidies for Single Mothers in the United States" *Journal of Population Economics,* forthcoming, (2007).

[4] Blau, D. and P. Robins "Child Care Demand and Labor Supply of Young Mothers Over Time" *Demography* **28(3)**, (August 1991): 333-352.

[5] Bloom, D. and C. Michalopoulos "How Welfare and Work Policies Affect Employment and Income: a Synthesis of Research " *New York: Manpower Demonstration Research Corporation* (2001).

[6] Child Care Bureau - Administration for Children and Families. "Access to Child Care for Low-Income Working Families" *Quarterly Journal of Economics,* (1999).

[7] Connelly, R. "The Effects of Child Care Costs on Married Women's Labor Force Participation" *Review of Economics and Statistics* **74(1)**, (1992).

[8] Currie, J. "U.S. Food and Nutrition Programs" *Means-Tested Transfers in the U.S., ed. R. Moffitt* , (2003).

[9] Dickert, S., S. Houser, and John Karl Scholz "The Earned Income Tax Credit and Transfer Programs: A Study of Labor Market and Program Participation," *Tax Policy and the Economy,* **Vol. 9, MIT Press, 1995**.

[10] Danziger, S.; R. Haveman; and R. Plotnick. 1981. "How Income Transfers Affect Work, Savings, and the Income Distribution." (19 September: 975-1028.).

[11] Eissa, N. and J. Liebman. "Labor supply response to the earned income tax credit" *Quarterly Journal of Economics,* (May 1996): 605-637.

[12] Ellwood, D. "The Impact of the Earned Income Tax Credit and Social Policy Reforms on Work, Marriage, and Living Arrangements " *National Tax Journal* **53**, (2000): 1063-1105.

[13] Fraker, T. and R. Moffitt "The effect of Food Stamps on Labor Supply: A Bivariate Selection Model" *Journal of Public Economics,* **35**, (August 1988): 1-24.

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

[15] Hotz, J. V. and John Karl Scholz "The Earned Income Tax Credit" *Means-Tested Transfers in the U.S., ed. R. Moffitt* , (2003).

[16] Hoynes, H. "Welfare Transfers in Two-Parent Families: Labor Supply and Welfare Participation under AFDC-UP." *Econometrica,* **64**, (March 1996): 295-332.

[17] Hoynes, H. "Work, Welfare, and Family Structure: What Have We Learned?" *Fiscal Policy: Lessons from Economic Research, ed. A. Auerbach. Cambridge: MIT Press.* (1997).

[18] Keane, M. and R. Moffitt "A Structural Model of Labor Supply and Multiple Program Participation" *International Economic Review,* **39(3)**, (August 1998).

[19] Kimmel, J. "Child Care Costs as a Barrier to Employment for Single and Married Mothers" *National Tax Journal* **53**, (2000): 1063-1105.

[20] Lee, Donghoon and K. Song "A Consistent Simulated MLE for Discrete Choices When the Number of Simulations is Finite", (Feb 2005).

[21] Lerman, S. and C. Manski "On the Use of Simulated Frequencies to Approximate Choice Probabilities" *in Structural Analysis of Discrete Data with Econometric Applications, eds. C. Manski and D. McFadden* (Cambridge, MA: MIT Press, 1981)

[22] Lurie, I. "Changing Welfare Offices" *Policy Brief, Washington: Brookings Institution* **9**, (2001).

[23] McFadden, D. "A Method of Simulated Moments for Estimation of Descrete Response Models without Numerical Integration" *Econometrica* **57(5)**, (Sep 1989): 995-1026.

[24] McKernan, S. et al. "The Relationship Between Metropolitan and non-Metropolitan Locations, Changing Welfare Policies, and the Employment of Single Mothers" Mimeo, Urban Institute (Aug 2000).

[25] Meyer, B. and D. Rosenbaum "Making Single Mothers Work: Recent Tax and Welfare Policy and its Effects" *NBER working paper w7491*, (Jan 2000).

[26] Meyer, B. and D. Rosenbaum "Welfare, the Earned Income Tax Credit, and the Labor Supply of Single Mothers" *The Quarterly Journal of Economics* **116(3)**, (Aug 2001): 1063-1114.

[27] Meyers, M.; T. Heintze, and D. Wolf "Child Care Subsidies and the Employment of welfare Recipients" *Working Paper, School of Social Work, Columbia University, New York,* (August 1999)

[28] Moffitt, R. 1983. "An Economic Model of Welfare Stigma." *American Economic Review 73* , (December): 1023-1035..

[29] Moffitt, R. 1992 "Incentive Effects of the U.S. Welfare System: A Review." *Journal of Economic Literature* , 30 (March): 1-61.

[30] Moffitt, R. "The Temporary Assistance for Needy Families Program" *Means-Tested Transfers in the U.S., ed. R. Moffitt* , (2003).

[31] O'Neill, J. and M. Hill "Gaining Ground? Measuring the Impact of Welfare Reform on Welfare and Work" *New York: Manhattan Institute* (2001).

[32] Ribar, D. "Child Care and the Labor Supply of Married Women: Reduced Form Evidence" *Journal of Human Resources* **27(1)**, (Winter 1992): 134-165.

[33] Schoeni, R. and R. Blank "What Has Welfare Reform Accomplished? Impacts on Welfare Participation, Employment, Income, Poverty, and Family Structure" **NBER Working Paper 7627**, (2000).

[34] U.S. General Accounting Office. "Child care: Federal funding for fiscal year 1997 " *GAO/HEHS* **70R**, (1998).

[35] GAO "Earned Income Tax Credit Eligibility and Participation" (December 2001).

[36] U.S. GAO "Welfare Reform: HHS Should Exercise Oversight to Help Ensure TANF Work Participation is Measured Consistently across States" (August 2005).

[37] U.S. House of Representatives. Committee of ways and means. “The Green Book 2004 ” (2004).

[38] Wallace, G. and R. Blank “What Goes Up Must Come Down?” *Economic Conditions and Welfare Reform.* Kalamazoo: Upjohn Institute , (1999).