Institute for Research on Poverty
Discussion Paper no. 1117-97

The Effect of the 1981 Welfare Reforms on AFDC Participation and Labor Supply

Paul A. Smith
University of Wisconsin–Madison

January 1997

I wish to thank Bob Haveman, Karl Scholz, and Michael Wiseman for their support and helpful suggestions. I also wish to thank John Rust, Ka-fu Wong, and participants of the University of Wisconsin Public Economics Workshop for comments and suggestions. All errors are my own.

Abstract

From 1992 to 1995, forty states applied for federal waivers in order to test new welfare reforms. About 80 percent of these waiver applications included expansions of earnings disregards and asset limits for welfare recipients. These changes would effectively reverse the changes imposed by the 1981 Omnibus Budget Reconciliation Act (OBRA81), which significantly restricted eligibility and reduced earnings disregards for working recipients. Hence an understanding of the effects of OBRA81 can be helpful in predicting the effects of new welfare reform proposals.

This paper presents empirical estimates of the labor supply and AFDC participation effects of the individual components of OBRA81. Estimates are obtained from a discrete-choice maximum likelihood model in which female heads of household choose among six welfare/work combinations: on or off welfare together with zero, half-time, or full-time work. The paper focuses on estimation of parameters that define the utility of leisure and of welfare participation.

Estimates are obtained from a sample of 2462 female heads of household from the Panel Study of Income Dynamics (PSID), covering the years 1978 to 1984. The changes imposed by OBRA81 are explicitly accounted for in the budget set, as are the decline in real benefits, changes in the federal tax system, and the interaction of AFDC and Food Stamps. Estimated utility parameters are used to decompose the individual effects of the 1981 reforms. Descriptive evidence shows that the overall effect of the legislation was to reduce participation by about 8 percent and cut the incidence of working recipiency by more than 40 percent. Simulations based on structural parameters suggest that lower real needs and payment standards reduced AFDC eligibility and participation by more than the OBRA81 changes combined. An important result is that for many recipients, the share of Food Stamps in total income increased as real AFDC benefits declined. Hence the Food Stamps program played an important role over this period in preventing the well-being of welfare recipients from eroding more than it did.

Estimated utility parameters are also used to predict the effects of hypothetical policy changes. Lower payment standards cause some recipients to leave welfare and others to increase their work effort. Working recipiency is significantly encouraged by lower benefit-reduction rates, but this effect is offset by lower labor supply among women drawn on to AFDC. Finally, the AFDC participation choice is quite responsive to wage levels, but increasing wages would have only a small effect on working recipiency in the absence of higher disregards.

The Effect of the 1981 Welfare Reforms on AFDC Participation and Labor Supply

I. INTRODUCTION

The Personal Responsibility and Work Opportunity Act of 1996 ends the federal government's largest cash assistance program for poor families, Aid to Families with Dependent Children (AFDC). AFDC, which was created as part of the Social Security Act of 1935, will be replaced by a system of federal block grants given directly to the states, each of which will then be responsible for maintaining its own welfare program for poor families. The 1996 act limits lifetime welfare participation to five years, requires able adults to work after two years, and denies participation to noncitizens, both legal and illegal. It retains the federal Food Stamp program, but with substantial cuts in spending.

Aside from these federal mandates, the design of each state's welfare program is unrestricted. The state is free to set benefit formulas, eligibility standards, and the program parameters that determine the interaction of various income sources. While it is too early to know what each of the new state programs will look like, evidence of the reforms being considered is provided by recent waiver applications submitted by states seeking to experiment with their welfare programs. From 1992 to 1995, forty states submitted waiver requests to the federal government (Savner and Greenberg 1995). Thirty-two of the forty states included plans to expand earnings disregards so that more recipients can work without losing eligibility. Thirty-one states planned to raise limits on allowable assets, so that more families may own cars and maintain savings accounts without losing eligibility.

These two proposals would effectively reverse federal regulations implemented under the 1981 Omnibus Budget Reconciliation Act (OBRA81), which restricted earnings disregards and imposed strict limits on assets. Hence an understanding of the effects of OBRA81 can help in predicting the effects of new welfare reform proposals.

This paper presents empirical estimates of the labor supply and AFDC participation effects of the individual components of OBRA81. Estimates are obtained from a discrete-choice maximum-likelihood model in which female heads of household choose among six welfare/work combinations: on or off welfare together with zero, half-time, or full-time work. The estimation is complicated by kinks in the budget constraint that arise from the loss of welfare benefits at higher income levels, the interaction of the AFDC and Food Stamp programs, and the progressivity of the federal tax system. Moreover, the simultaneity of the AFDC participation and labor-supply decisions indicates that the set of kinks faced by each household is endogenous. Hence for each household a complicated nonlinear budget constraint must be computed for each possible choice of AFDC participation and labor supply. The discrete-choice approach to labor supply simplifies this problem considerably, since it reduces the number of points at which the budget constraint must be evaluated.

While previous models of program participation and labor supply have utilized a reduced-form participation equation, what is estimated here is an analytically tractable structural model of simultaneous welfare and work choices. The paper focuses on parameters that define the utility of leisure and of welfare participation.[1]

Data come from the Panel Study of Income Dynamics (PSID). The model is estimated on a sample of 2462 female heads of household over the years 1978 to 1984. The changes imposed by the 1981 OBRA are explicitly accounted for in the budget set, as are declining real benefit levels, changes in the federal tax system, and the interaction of AFDC and Food Stamps. Estimated utility parameters are used to decompose the individual effects of the 1981 reforms.

Descriptive evidence shows that the overall effect of the legislation was to reduce participation by about 8 percent and cut the incidence of working recipiency by more than 40 percent. Simulations based on

[1]Disutility from welfare participation may arise through welfare stigma or transactions costs.

structural parameters suggest that lower real needs and payment standards reduced AFDC eligibility and participation by more than the OBRA81 changes combined. An important result is that for many recipients, the share of Food Stamps in total income increased as real AFDC benefits declined. Hence the Food Stamps program played an important role over this period in preventing the well-being of welfare recipients from eroding more than it did.

Estimated utility parameters are also used to predict the effects of hypothetical policy changes. Lower payment standards cause some recipients to leave welfare and others to increase their work effort. Working recipiency is significantly encouraged by lower benefit-reduction rates, but this effect is offset by lower labor supply among women drawn on to AFDC. Finally, the AFDC participation choice is quite responsive to wage levels, but increasing wages would have only a small effect on working recipiency in the absence of higher disregards.

The paper is organized as follows: Section II discusses estimation issues in models of welfare and work. Section III provides a brief review of the related literature. Section IV outlines the model and details of the estimation technique. Section V discusses the data and construction of the budget constraint. Section VI presents estimation and simulation results, and Section VII concludes.

II. ESTIMATION OF MODELS OF WELFARE AND WORK

Participation in AFDC potentially affects labor supply because the AFDC benefit declines with earnings. The work disincentive inherent in this formula has long been recognized, and in 1967 the rate of benefit reduction was reduced in an attempt to reduce the disincentive. The 1967 reforms required states to disregard $30 plus one-third of remaining monthly earnings, plus expenses related to work and child care.[2]

[2]The "thirty-and-a-third" rule applied only to benefit calculation. When making the initial eligibility determination, only work and child care expenses were applied.

The 1981 reforms repealed the thirty-and-a-third disregard after four consecutive months of earnings. In addition, OBRA81 limited the work-expense and child-care expense disregards, and changed the order of disregards in a way that reduced the total amount disregarded.

OBRA81 also imposed new eligibility restrictions. Before the 1981 law, families whose countable income (income net of disregards) was less than the state's need standard were entitled to benefits. OBRA81 denied eligibility to families whose pre-disregard income was over 150 percent of the state need standard. Finally, OBRA81 imposed a new asset limit of $1000 per family, not including the value of a home and up to $1500 for one car. The overall result of these changes was that drastically fewer recipients could maintain eligibility while working, and hence the work disincentive in the AFDC program was significantly increased.[3]

In principle, estimating the effect of the AFDC program on labor supply is simply a matter of estimating a labor-supply equation with respect to a piecewise-linear budget constraint. Kinks arise in the budget constraint from the loss of welfare benefits at higher income levels, the interaction of the AFDC and Food Stamps programs,[4] and the progressivity of the federal tax system.

Typical budget constraints for welfare recipients are shown in Figures 1a and 1b. Figure 1a depicts a monthly budget constraint facing a median low-income worker in 1978.[5] The straight diagonal line

---

[3]The 1984 Deficit Reduction Act (DEFRA) and the 1988 Family Support Act (FSA) relaxed some of the OBRA81 restrictions, such as reinstating the $30 (but not the one-third) earnings disregard, increasing the work-expense and child-care expense disregard caps, and increasing the gross eligibility screen to 185 percent of the state's need standard.

[4]Though the focus of this paper is on AFDC participation, Food Stamp benefits are included because almost all AFDC recipients also receive Food Stamps. Conversely, I assume Food Stamp participation ends whenever AFDC participation ends.

[5]Figure 1a was calculated using the median predicted real wage of my 1978 sample, $7.92, and the median real needs and payment standards for a family of two in 1978, $468 and $419, respectively. The calculation assumes zero unearned income (aside from AFDC and Food Stamps), and assumes that the worker filed a head-of-household return and took the appropriate Earned Income Tax Credit.

represents a hypothetical budget constraint in the absence of any taxes or transfers. This line has a constant slope equal to the negative of the wage rate. Hours of leisure are measured on the

Figure 1a

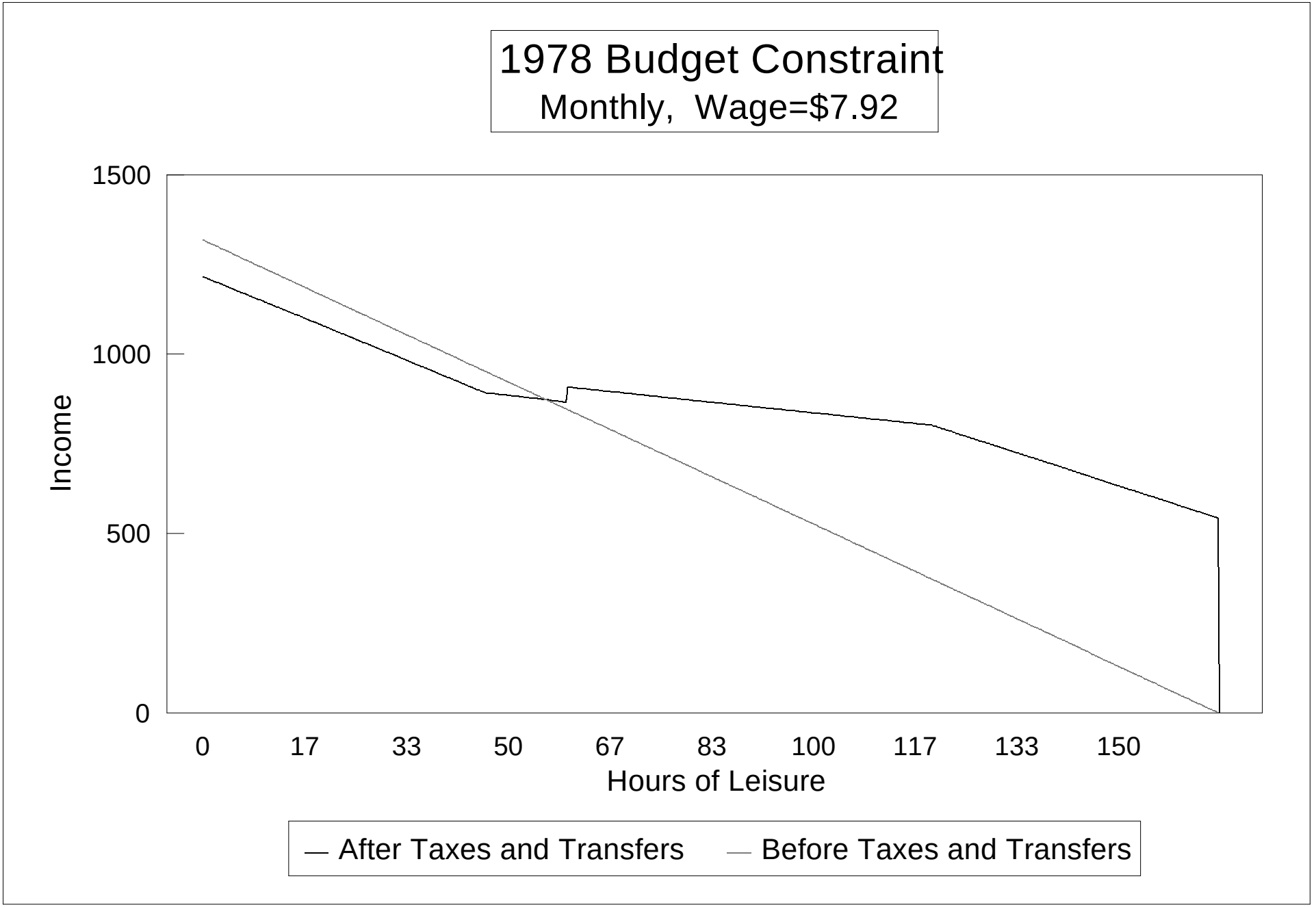
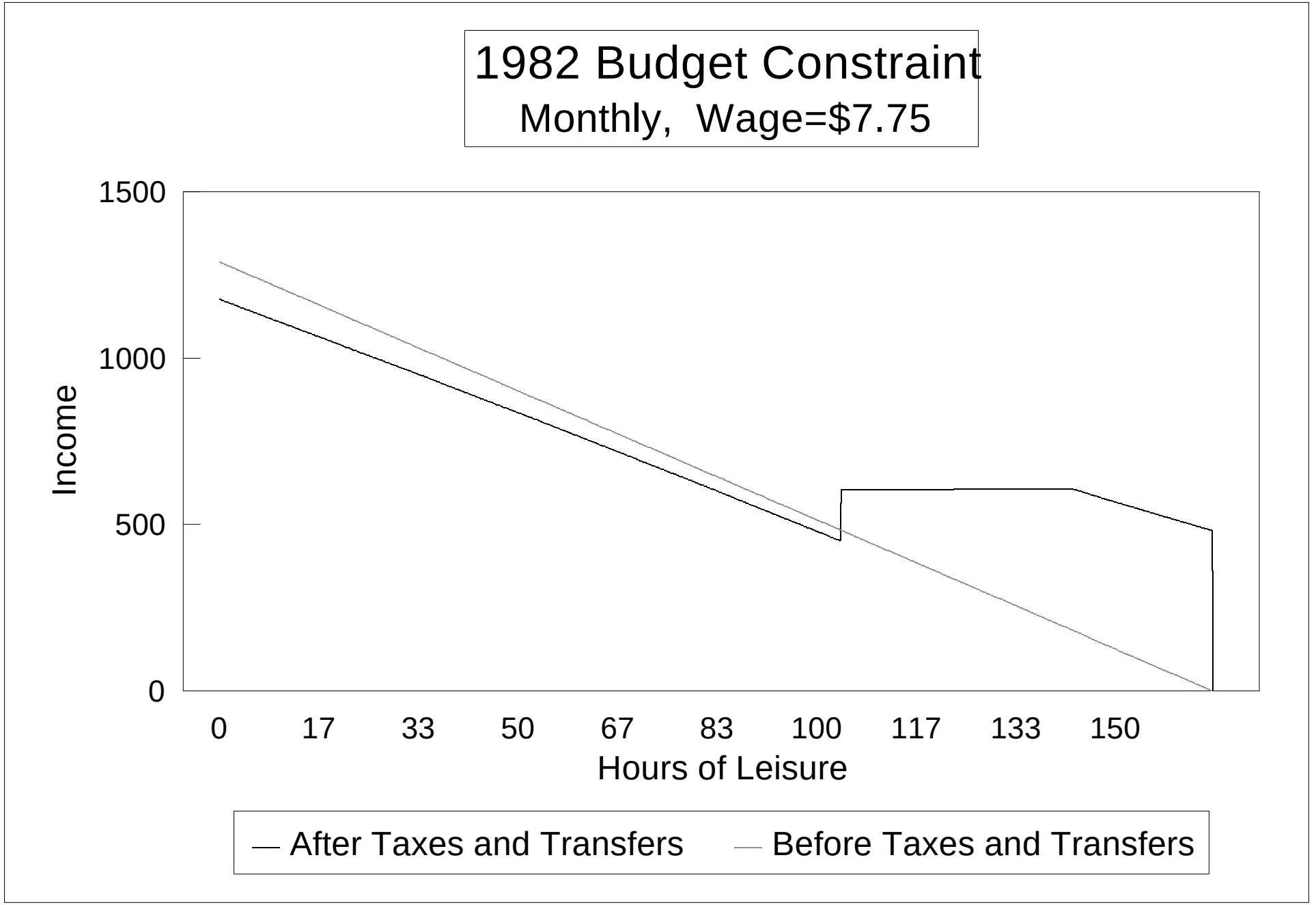

1978 Budget Constraint
Monthly, Wage=$7.92
1500
1000
500
0
Income
0
17
33
50
67
83
100
117
133
150
Hours of Leisure
After Taxes and Transfers
Before Taxes and Transfers

Figure 1b


1982 Budget Constraint
Monthly, Wage=$7.75
1500
1000
500
0
Income
0
17
33
50
67
83
100
117
133
150
Hours of Leisure
After Taxes and Transfers
Before Taxes and Transfers

horizontal axis, with the maximum set to 167.[6] The kinked line represents the budget constraint faced by the worker after federal taxes and transfers. Starting at the right-hand side of the figure, the value of the kinked budget constraint at zero hours of work (full-time leisure) represents income from AFDC and Food Stamps only. Moving to the left, total income increases as the worker adds earnings to transfer income. The first kink represents the end of disregards and the beginning of the benefit-reduction region.[7] The notch represents the loss of eligibility for Food Stamps, and the final kink represents the loss of eligibility for AFDC. At full-time work (the left-hand side of the figure), the slope of the kinked budget line is constant and equal to the negative of the product of the wage rate and the federal marginal tax rate.

Figure 1b depicts the budget constraint facing the median worker in 1982, after OBRA81 was implemented.[8] The 1982 budget constraint is strikingly different from the 1978 constraint. Disregards end at a lower level of work, and benefits are taxed at 100 percent when disregards end, resulting in a completely flat region of the budget constraint.[9] The notch corresponding to the loss of eligibility occurs sooner and is significantly larger than in 1978; this is because AFDC and Food Stamp eligibility end at the same level of income.[10] The increased work disincentive in Figure 1b is readily seen: along the flat portion,

---

[6]One hundred-sixty-seven hours per month corresponds to a standard definition of "full-time work," which is 2000 hours per year. Hence "leisure" is measured relative to full-time work, not relative to the total number of hours in the month.

[7]In this figure, AFDC benefits are taxed at 67 percent of earnings and Food Stamps are taxed at 30 percent of earnings. When calculating Food Stamp benefits, AFDC benefits are also counted and taxed at 30 percent, though the reverse interaction is not true. This explains why eligibility for Food Stamps ends before eligibility for AFDC.

[8]The median real wage in the sample in 1982 was $7.75, and the median real needs and payment standards were $388 and $300, respectively.

[9]Calculations assume the four-month period of the thirty-and-a-third disregard has expired; hence AFDC benefits are taxed at 100 percent of earnings.

[10]Recall that Food Stamp benefits are assumed to end with AFDC participation.

leisure can be increased without reducing income. Note also that this AFDC recipient could work part time (80 hours) in 1978 without losing eligibility, but could not in 1982.

Given the correct piecewise linear budget constraint for each individual, it is natural to consider estimating the impact of the AFDC benefit reduction rate on labor supply from a sample of AFDC participants. A straightforward approach is to assume utility maximization subject to the nonlinear budget constraint, and estimate how the labor-supply choices of recipients change with the benefit-reduction rate.

The problem with this approach is that it ignores the endogeneity of AFDC participation. The presence of significant numbers of nonparticipating eligibles suggests individual heterogeneity in tastes for welfare participation. Researchers have speculated that a socially derived sense of stigma may account for nonparticipation of some eligible individuals, as well as the presence of transactions costs, such as the time spent waiting in line or reporting to welfare authorities.[11]

The fact that some eligible individuals choose not to participate implies that the form of the budget constraint is endogenous, since nonparticipants do not face the kinks created by the means-tested benefits. This is problematic because unobserved components of tastes for welfare are likely to be correlated with unobserved components of tastes for work, which implies that labor-supply responses of participants are likely to vary systematically from those of nonparticipants. Put differently, changes in AFDC parameters affect behavior on the extensive margin (i.e., change an individual's probability of being a recipient) as well as on the intensive margin (i.e., changing a recipient's probability of working). Consequently, the AFDC-participation decision must be estimated simultaneously with the labor-supply decision.

The need to estimate the labor-supply equation jointly with a limited-dependent variable participation equation complicates the estimation problem considerably, especially when modeling the more accurate budget set that includes Food Stamp benefits and federal taxes. This paper follows the approach

[11]See Moffitt (1983) for the first analysis of welfare stigma.

of Fraker and Moffitt (1988), Hoynes (1996), Van Soest (1995), and Keane and Moffitt (1996) in modeling a discrete, rather than continuous, hours choice. Not only does this approach avoid the necessity of computing the locations of numerous segments and kink points, but it also makes available a powerful multinomial discrete-choice framework for analyzing the simultaneous work-welfare choice. Consequently, the hours choice is divided into three discrete choices, representing no work, part-time work, and full-time work.

III. A BRIEF REVIEW OF THE LITERATURE

Over the last thirty years, a large empirical literature has developed that reports reduced-form estimates of the impact of AFDC program rules on the labor supply of participants. Danziger, Haveman, and Plotnick (1981) and Moffitt (1992) review the evidence on the effect of AFDC on labor supply, concluding that the research shows unequivocally that AFDC generates nontrivial work disincentives, with estimated magnitudes ranging from 10 to 50 percent of pre-transfer labor supply. Moffitt (1992) also reviews the evidence on the effect of AFDC parameters (mainly the benefit level and the benefit-reduction rate) on welfare participation. Almost all studies find a statistically significant increase in participation probabilities with respect to the benefit level, and a statistically significant decrease with respect to the benefit-reduction rate. Blank and Ruggles (1996) explore the determinants of openings and closings of eligibility spells versus participation spells in AFDC and Food Stamps. They find that many spells of eligibility end without participation, and many spells of participation end before eligibility is lost. Some of these spell closings they attribute to unreported earnings.

A small literature of reduced-form studies of OBRA81 also exists. Moffitt (1986) reviewed the evidence on the effects of OBRA81 on labor supply, concluding that there is some evidence that the higher benefit-reduction rate reduced hours of labor supplied. But the available studies, he argued, provided only

weak evidence, ended too soon (none extended beyond the first few months of 1983, while OBRA81 was implemented in 1982), and suffered from design flaws. Feaster, Gottschalk, and Jakubson (1987) used administrative panel data from Wisconsin to estimate the effect of OBRA81, finding little effect on months worked. Again, the study was limited to short-run effects (following women through September 1982), and did not address the impact of OBRA81 on AFDC participation. Hutchens (1986) reviews six reduced-form studies of OBRA81, citing evidence that the 1981 law reduced the probability of being a working recipient and increased the probability of leaving the program.

Perhaps the clearest evidence of the net effect of OBRA81 on the labor supply of recipients comes from administrative records kept by the federal government. The records show that in 1979, 5.4 percent of recipients worked part time and 8.7 percent worked full time. By 1983, only 3.4 percent worked part time, and only 1.5 percent worked full time (*Green Book* 1994).[12] However, these records do not capture changes in labor supply among women who left AFDC as a result of OBRA81.

Recognizing that labor supply and AFDC participation decisions are made jointly, the literature has moved in the last fifteen years toward models featuring simultaneous labor-supply and AFDC participation choice. At the same time, the literature has been moving toward structural models, in which a utility framework is specified for the choice problem. Rather than estimating reduced-form coefficients, the goal of the structural literature has been to obtain estimates of underlying utility parameters, which can then be used to simulate the effects of any number of policy changes.

Recently, both trends in the literature have come together, producing papers which estimate structural models of simultaneous labor-supply and program-participation choices. Fraker and Moffitt (1988), Hoynes (1996), and Keane and Moffitt (1996) are important papers in this genre. Such models must overcome the difficult, if not intractable, problems inherent in estimating simultaneous equations of

[12]Note that the imposition of OBRA81 coincides with the onset of the 1982 recession. The national average unemployment rate was 5.8 percent in 1979 and 9.6 percent in 1983.

limited dependent variables. The primary difficulty faced by these models is the lack of a tractable analytic solution to the choice problem, while a secondary issue is the need to evaluate multiple integrals.[13] The lack of a tractable analytic, or algebraic, solution to the individual's simultaneous choice problem makes it impossible to derive estimates of utility parameters directly from the individual's maximization problem in the standard way.

Each of the papers mentioned above has addressed the tractability problem differently. Fraker and Moffitt simplify their model of labor supply and AFDC and Food Stamp participation by estimating reduced-form, rather than structural, AFDC participation equations. In her study of labor supply and AFDC-UP participation, Hoynes simplifies the choice problem by assuming discrete, rather than continuous, distributions on the two error terms. Finally, in their study of labor supply and multiple-program participation, Keane and Moffitt solve both the choice problem and the numerical evaluation problem by using recently developed techniques of simulation estimation.

IV. THE MODEL AND ESTIMATION TECHNIQUE

In order to estimate the effects of OBRA81 on labor supply and AFDC participation, this paper develops a structural model of simultaneous choice for which there is a tractable analytic solution. Estimates of utility parameters can then be derived directly from the choice problem using maximum likelihood estimation. The application of the structural model to the specific policy change allows a detailed decomposition of the effects of the 1981 reforms. In addition, by comparing predictions from the model to observed outcomes after the reforms, the policy change is used as a historical benchmark against which to

[13]The numerical evaluation of second- or third-order integrals is well within the capability of modern computers. It is the intractability of the choice problem that presents the biggest obstacle.

assess the predictive power of the model. Finally, the model is used to simulate the effects on labor supply and program participation of various recent welfare reform proposals.

Discretizing the hours choice into no work, part-time work, and full-time work transforms the estimation problem into a two-equation discrete-choice problem with six alternatives: the three hours points together with on or off welfare. The individual's objective is to choose the alternative that maximizes utility subject to the nonlinear budget constraint. Consider a simple class of utility functions that are separable in participation utility:[14]

$$U(L,Y,P) = \overline{U}(L,Y) - \phi P, \tag{1}$$

where L represents leisure, Y is income, and P=1 if the individual participates. Note that even when $\overline{U}_L > 0$ and $\overline{U}_Y > 0$, as is usually assumed, an individual with sufficiently large distaste for welfare, ϕ, may decline to participate even when participation increases both leisure and income.

The budget constraint takes the form:

$$\begin{aligned} L(H) &= \overline{L} - H \text{ and} \\ Y(H,P) &= wH + N + B(H,w,N) \cdot P - T(H,w,N), \end{aligned} \tag{2}$$

where H represents the hours choice, w is the wage rate, N is nonlabor income, B is the sum of AFDC and Food Stamp benefits, and T represents positive federal taxes.[15] The endogeneity of the form of the budget

[14]I refrain from using the term "stigma" because disutility from participation may also be due to transactions costs.

[15]The calculation of benefits and taxes is described in Section V.

constraint is made explicit by the appearance of the choice variable *P* in equation (2). The nonlinearity of the budget constraint enters via *B* and *T*.

To implement the discrete-choice approach, let $d_j = 1$ if $(P,H) = j$. Then:

$$d_j = 1 \text{ iff } U_j \geq U_{j'} \; \forall \; j' \qquad \textbf{(3)}$$

where $U_j \equiv U(Y, (P, H) = j)$. Equation (3) is the revealed-preference inequality. This will form the basis of the choice probability, and hence the individual's contribution to the likelihood function.

Estimation of the model defined by equations (1)–(3) requires three steps for each individual: first, calculation of the budget set (i.e., payoffs from each of the six alternatives); second, *analytical* derivation of the regions of error space within which each alternative is optimal; and third, evaluation of the choice probability.

It is the second step that has been intractable in recent studies. It is tractable here because what is estimated here is a "lower-order" problem, in the sense that it involves fewer alternatives (six) and a lower-dimensional error space (two). By contrast, Fraker and Moffitt's study of labor supply, AFDC, and Food Stamps features twelve alternatives and three error terms. Hoynes' analysis of the two-parent AFDC-UP program and labor supply features eighteen alternatives and three error terms. Finally, Keane and Moffitt's study of labor supply and multiple-program participation features twenty-four alternatives and five error terms. The high dimensionality of these models renders the analytic solution to choice problem intractable.

The narrower focus of the present study makes the solution to the analytic problem tractable. The three hours points and two program options define six discrete choices. The six alternatives, in turn, impose five revealed-preference inequalities for each choice. To translate the revealed-preference inequalities into

choice probabilities, the inequalities are written as restrictions on the two error terms. The two-dimensional error space can then be mapped into regions in which each choice is optimal.[16]

With five restrictions on two error terms, it must be the case that three inequalities do not bind. Unfortunately, it is impossible to know a priori which restrictions will bind, because the planes that divide the error space are functions of the error terms themselves, as well as of data and parameters. For example, which constraint on the second error term binds depends on the realization of the first error term.[17] The inability to predict which inequalities bind suggests that the estimation algorithm itself must calculate the boundaries and impose the binding constraints.

For the functional form of the utility function, this paper assumes a standard log-linear specification:

$$U_{ij} = \ln Y_{ij} + \delta_i \ln L_j - \phi_i P_j, \qquad \textbf{(4)}$$

where U_{ij} represents individual i's utility from choice j, Y is income, δ_i indexes individual i's utility of leisure, L represents leisure, ϕ_i indexes participation utility, and $P = 1$ if the individual participates. Normalizing the income-utility parameter to one helps identify the model, and has the effect of translating the remaining parameters into money terms. Note that when $\delta_i > 0$ and $\phi_i > 0$, then $U_Y > 0$, $U_L > 0$, $U_{YY} < 0$, $U_{LL} < 0$, and $U_{YL} = U_{LY} = 0$. Hence, this functional form is a convenient way to impose diminishing marginal utility in income and leisure. The assumption of zero cross-derivatives is restrictive, but it has the strong advantage of analytical convenience, simplifying the calculation of utility differences.

---

[16]An important caveat is that for a given individual, certain alternatives may be dominated over the entire error space.

[17]Put differently, the region in error space within which a given choice is optimal may be irregularly shaped, because the boundaries of the region may be formed by the envelope of several planes. Which plane forms the boundary depends on the location within the region.

The stochastic specification allows for individual heterogeneity in both a labor-supply preference parameter and an AFDC-participation preference parameter. The heterogeneity comes from preference components unobserved by the econometrician but known to the individual (hence the individual's problem is deterministic). Furthermore, the econometrician should treat the unobserved preference components as potentially correlated.

The stochastic specification allows observed and unobserved individual heterogeneity in the labor-supply and AFDC preference parameters:

$$\begin{aligned} \delta_i &= \psi_\delta X_{i\delta} + \varepsilon_{i\delta} \\ \phi_i &= \psi_\phi X_{i\phi} + \varepsilon_{i\phi} \end{aligned} \qquad \textbf{(5)}$$

where $E(X\varepsilon_\delta) = E(X\varepsilon_\phi) = 0$ and $(\varepsilon_\delta, \varepsilon_\phi) \sim N(0, \Sigma)$. Initially, this model was estimated with the elements of the covariance matrix Σ unrestricted. However, for all available specifications of δ_i and ϕ_i, the estimation algorithm pushed the estimate of ρ, the correlation coefficient between the two error terms, close enough to the limit of one to render the algorithm unstable. This result was robust to available choices of the elements of the vectors X_i, the scaling of the data, and even the estimation algorithm itself.[18] Hence the results that follow are based on the model estimated with the restriction $\rho = 0.99$ imposed. A correlation coefficient close to one is not theoretically problematic; it means only that for this model and data set, the effects of unobserved characteristics on the preference for welfare are virtually identical to the effects of unobserved characteristics on the preference for leisure. Put differently, unobserved characteristics that affect tastes for welfare invariably also affect tastes for work, and by the same magnitude. This is not entirely surprising,

[18]The primary estimation algorithm used was a standard gradient-based maximum likelihood method using numerical integration of the bivariate integral. However, the same result was observed simulating out the bivariate integral with a simulated maximum likelihood (SML) algorithm, and even under a nongradient-based simulated annealing (SA) algorithm.

given the empirical regularity that for the vast majority of female heads of household, work and welfare are perfect substitutes.[19]

The first step in estimating the model is an accurate calculation of each individual's budget constraint. Construction of the budget constraint is described in detail in Section V. With the payoffs for each choice for each individual in hand, the second step is analytical calculation of the implied restrictions on the error terms that correspond to an individual's observed choice. These are obtained by solving the appropriate set of revealed-preference inequalities for the two error terms.[20]

In the third step, the likelihood function is formed by translating the error-term restrictions into choice probabilities, and summing over individuals. Let $P(d_j \mid X, \theta)$ denote the probability of choosing work-welfare option j, conditional on a vector of observed characteristics and unknown parameters. Then the probability that individual I chooses choice j is:

$$P(d_{ij}|X_i,\theta) = P(U_{ij} \geq U_{i'j'}|X_i,\theta) \quad \textbf{(6)}$$

Recall that because the revealed-choice inequality imposes five restrictions on two error terms, three of the five revealed-preference inequalities will not bind. Given the specification of the model, the revealed-preference inequalities take the form:

[19]As will be discussed in Section VI, the restricted model converges well and performs well in predicting the actual choices made by the sample. An alternative restricted model with rho imposed to one, which collapses to a univariate model, converges quickly to similar parameters, but does not predict the actual choices of the sample quite as well.

[20]As noted previously, there will be more than one restriction per error term, so that only one restriction per error term will bind.

$$\begin{aligned} \varepsilon_\delta &< a_1(X,\theta) \\ \varepsilon_\delta &< a_2(X,\theta) \\ \varepsilon_\phi &< b_1(X,\theta) \\ \varepsilon_\phi &< b_2(X,\theta,\varepsilon_\delta) \\ \varepsilon_\phi &< b_3(X,\theta,\varepsilon_\delta), \end{aligned} \qquad \textbf{(7)}$$

where a_1, a_2, and b_1 are constant functions of data and parameters, and b_2 and b_3 are functions of data, parameters, and ε_δ. In general, only the minimum a function and minimum b function will bind. The minimum b function is found by integrating out ε_δ. The choice probability is thus:

$$P(d_j|X,\theta) = \int_{-\infty}^{\min\{a_1,a_2\}} \int_{-\infty}^{\min\{b_1,b_2,b_3\}} f(\varepsilon_\delta,\varepsilon_\phi;\rho)d\varepsilon_\phi d\varepsilon_\delta, \qquad \textbf{(8)}$$

and the log-likelihood function is:

$$L(\theta) = \sum_{i=1}^{N} \log P(d_{ij}|X_i,\theta), \qquad \textbf{(9)}$$

where d_{ij} represents the probability that individual I chose the observed choice. Parameters are estimated by maximizing L with respect to θ. The evaluation of the *min* functions in the limits is not problematic; however, their presence does make the gradient of the likelihood discontinuous. This is inconvenient when using a derivative-based maximization algorithm, because jumps in the gradient impede convergence of the estimator. Fortunately this problem can be addressed by utilizing the following smooth approximation to the *min* function:

$$\min[a_1,...,a_n] \approx k \log \sum_i \exp(a_1/k) \qquad \textbf{(10)}$$

for small negative k.[21] In the estimation that follows, I use k = -0.01. Standard errors are calculated from the outer product of the gradient of L.

V. THE DATA, THE DEPENDENT VARIABLE, AND THE BUDGET SET

The Data

To build a model that performs well in predicting actual choices, it is important to capture the budget constraint as accurately as possible. This section describes the construction of the individual budget constraints for the sample used in this paper.

Data come from the Panel Study of Income Dynamics (PSID). The PSID has two main advantages over other data sources: its detailed questions on income sources and labor supply, and a time frame long enough to span the pre-1981 and post-1981 periods. A disadvantage of the PSID is that it contains annual, rather than monthly, observations over the OBRA81 period. Monthly observations are preferable in estimating labor supply and AFDC participation choice because individuals may experience separate spells of work and welfare in a single year.[22] Despite this disadvantage, however, the PSID appears to be the best source of data for this model.[23]

The sample includes all female heads of household with children from the 1978, 1980, 1982 and 1984 waves of the PSID. While the AFDC program does include some male-headed households, female heads are usually studied because they are overrepresented in the low-income population and make up the vast majority of AFDC cases. The period 1978 to 1984 is chosen to capture a relatively wide observation

---

[21]A small positive k will approximate the max. I thank John Rust for suggesting this technique.

[22]More recent waves of the PSID include monthly measures of several variables. The annual data problem and a method for reducing its severity will be discussed later in this section.

[23]The Survey of Income and Program Participation (SIPP) has monthly observations, but it began after the 1981 reforms were enacted.

of both the pre-OBRA81 and post-OBRA81 periods.[24] Since estimation is computationally intensive, only alternating years were sampled in order to keep the sample size from growing too large. Observations on female-headed households with children from each year were pooled to form the sample. Individuals older than 60 and disabled individuals were dropped, because these individuals are likely to have systematically different labor-force attachments. The final sample has 2462 observations.

Definition of the Dependent Variables

Individuals are said to participate in AFDC if they report any AFDC income for the year. Labor-supply choices are assigned in the following way: those who report 1681 or more annual hours are said to work full time, those who report 120 to 1680 annual hours of work are said to work part time, and all others are assigned zero hours of work.[25]

A significant problem with an annual data set is imperfect observations of welfare and work spells. For example, an individual who experiences a three-month spell of welfare without work, followed by a nine-month spell of full-time work without welfare, is recorded in the PSID as an AFDC recipient who worked part time, even though she never worked while on welfare. An examination of the observed distribution of individuals across the six work-welfare choices confirms the significance of this problem. Table 1, Panel A shows the "unadjusted" distribution of work-welfare choices. Fully 32 percent of participants are recorded as working part time, while administrative records indicate only 4 to 6 percent of AFDC recipients are working part time. Note that these measures are not strictly comparable for two reasons. First, the PSID measure is over the

[24]Sampling beyond 1984 raises new difficulties because the 1984 DEFRA was implemented in early 1985.

[25]One hundred-twenty annual hours corresponds to 2.5 hours per week for 48 weeks and 1680 annual hours corresponds to 35 hours per week for 48 weeks.

TABLE 1

Observed Distributions of Labor Supply and AFDC Participation
(Percentage of sample)

A. Unadjusted Distributions

	Labor Supply			
	Nonworkers	Part Time	Full Time	Row Total
Joint Distribution				
Off AFDC	9.9%	21.3%	36.3%	67.5%
On AFDC	19.5%	10.3%	2.7%	32.5%
Conditional on AFDC				
Off AFDC	14.6%	31.5%	53.8%	100.0%
On AFDC	59.9%	31.7%	8.4%	100.0%

B. Adjusted Distributions

	Labor Supply			
	Nonworkers	Part Time	Full Time	Row Total
Joint Distribution				
Off AFDC	9.9%	21.3%	36.3%	67.5%
On AFDC	26.3%	4.4%	1.9%	32.5%
Conditional on AFDC				
Off AFDC	14.6%	31.5%	53.8%	100.0%
On AFDC	80.9%	13.4%	5.7%	100.0%

course of a year, and hence reflects cumulative spells of work, while the administrative record is at a given point in time. Second, it is likely that some recipients work without reporting the employment to caseworkers.

Still, it is likely that the PSID measure is overstating part-time work among recipients. This interpretation is supported by comparing these numbers to the analogous numbers in Fraker and Moffitt and Keane and Moffitt. Fraker and Moffitt, using quarterly pre-1981 data, find that 14 percent of participants work part time, and 14 percent work full time. Keane and Moffitt, using monthly post-1981 data, find 5 percent of participants work part time, and 4 percent work full time.

Given the inability to observe the pattern of spells of work and welfare with annual data, the question arises whether a given AFDC recipient who is recorded in the PSID as working part of the year worked concurrently with AFDC receipt, or worked during a spell without AFDC. If she did not work concurrently with AFDC receipt, then she should be recorded as a nonworker, rather than a part-time worker.

This question cannot be fully answered without monthly observations. But the answer can be approximated by comparing actual reported AFDC benefits with predicted benefits under two competing scenarios: first, that recipients worked while receiving benefits, and second, that recipients did not work while receiving benefits. Individuals whose reported AFDC benefits were consistent with being nonworkers while receiving welfare were reclassified as nonworking recipients, resulting in an adjusted empirical joint work-welfare distribution. The adjusted distribution is shown in Table 1, Panel B. Over half of the recipients who were recorded as part-time workers were reclassified on the basis of their reported benefit levels: the proportion of recipients working part time falls from 31.7 percent to a more believable 13.4 percent, and the proportion working full-time falls from 8.4 percent to 5.7 percent. The analysis that follows is based on the adjusted distribution of work-welfare choices.

Table 1, Panel B also shows that 33 percent of female heads in the sample participated in AFDC. As in previous studies, the joint distribution of labor supply and participation is strikingly asymmetric: 81 percent of participants are nonworkers, while 54 percent of nonparticipants work full time.

Construction of the Budget Set

To estimate the parametric model, each individual's earnings, federal taxes, and benefits must be calculated for all six choices. Real monthly earnings were predicted by multiplying the hourly real wage by 80 for part-time work and 160 for full-time work. A common problem when predicting earnings is the lack of wage data for nonworkers. In this paper, predicted wages are used for all workers. Predictions were made with a standard selection-corrected wage regression using my sample of working female heads of household. Regressors included a constant, nonwhite dummy, age, age squared, education, county unemployment rate, inverse Mills ratio from the first-stage labor-force participation probit, and a complete set of state dummies. The distribution of predicted wages is given in Figure 2. The mean predicted wage is $7.96 in constant 1994 dollars, the median is $7.82, and the standard deviation is $2.23.

The second component in constructing the budget constraint is the calculation of federal taxes. Federal income and social security taxes and the Earned Income Tax Credit (EITC) were predicted for each individual at each hours point. The calculation was made assuming workers filed a head-of-household return, claimed themselves and children as exemptions, and took the standard deduction. Marginal tax rates, brackets, and exemption amounts for 1978 to 1984 were taken from Pechman (1987). The Social Security wage base and tax rates from 1978 to 1984 were taken from Section 3 of the 1994 *Green Book*. The EITC rate, maximum credit, phaseout rate, and phaseout range were taken from Section 16 of the *Green Book*.

Figure 2

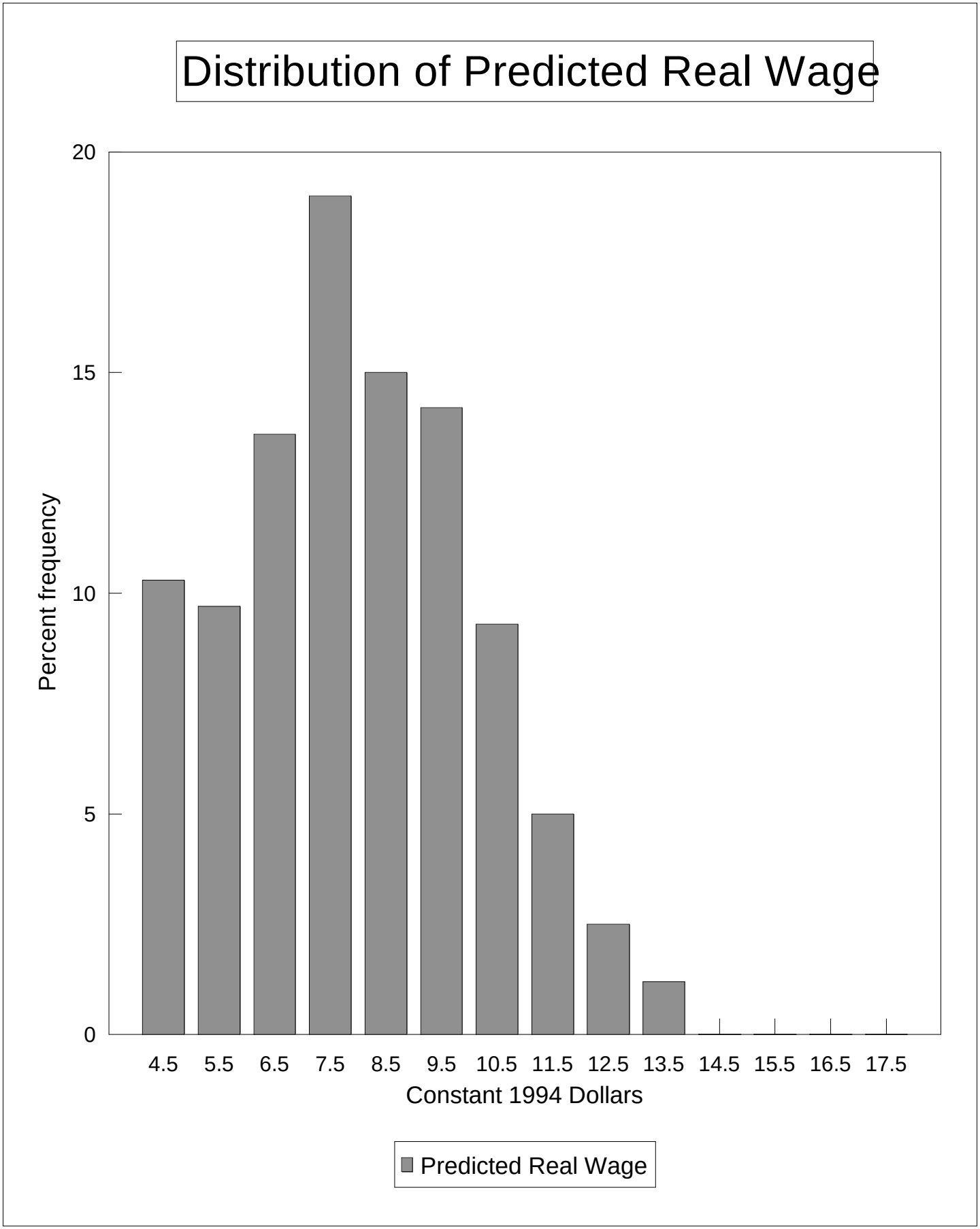

Distribution of Predicted Real Wage
20
15
10
5
0
Percent frequency
4.5
5.5
6.5
7.5
8.5
9.5
10.5
11.5
12.5
13.5
14.5
15.5
16.5
17.5
Constant 1994 Dollars
Predicted Real Wage

Figure 3

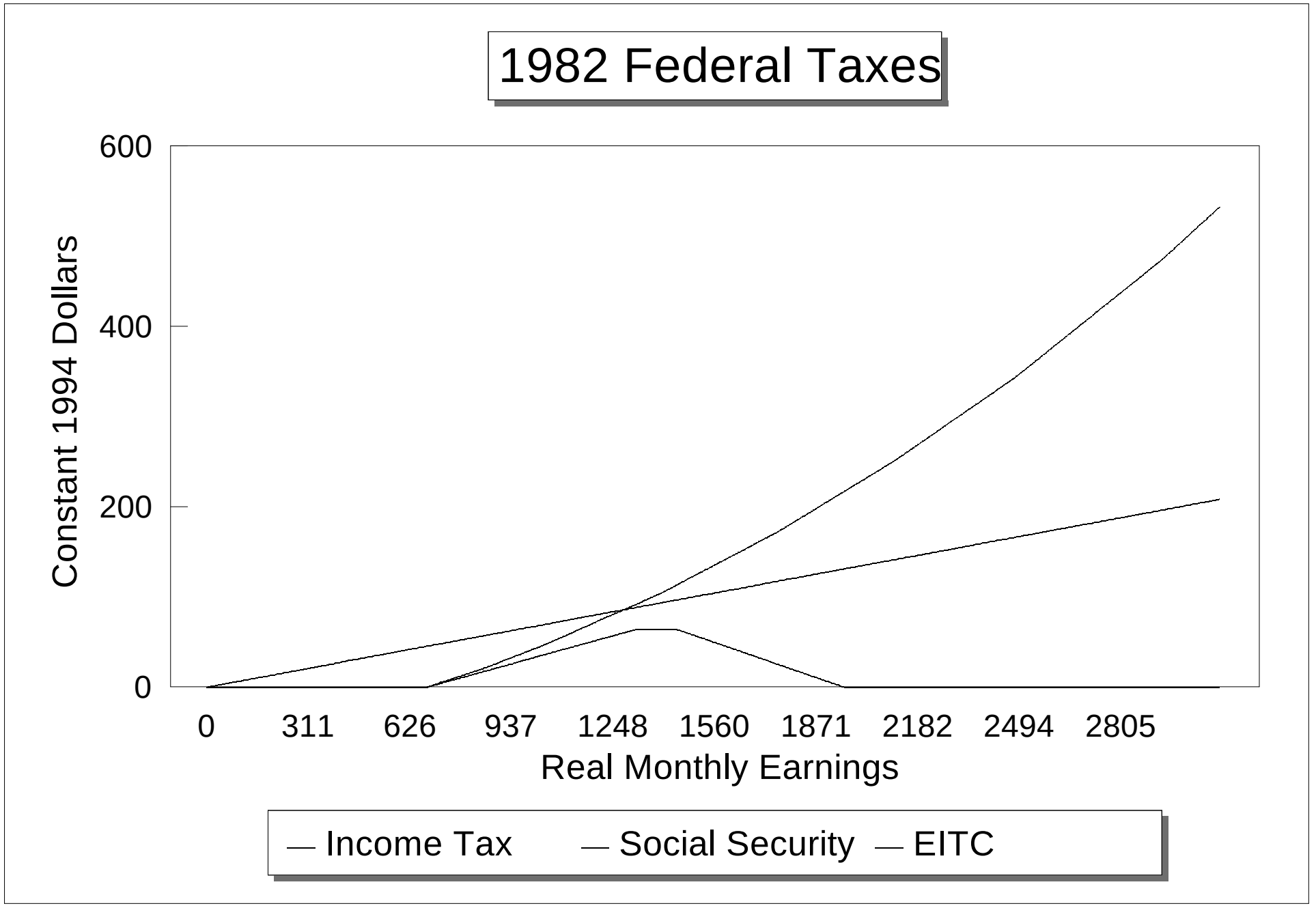

1982 Federal Taxes
600
400
200
0
Constant 1994 Dollars
0
311
626
937
1248
1560
1871
2182
2494
2805
Real Monthly Earnings
Income Tax
Social Security
EITC

Figure 3 shows how the 1982 income tax, social security tax, and EITC vary as earnings increase.[26] Due to dependent exemptions and progressively higher marginal tax rates, the income tax graph remains zero for the first dollars of earnings, then increases at an increasing rate. By contrast, the social security tax begins with the first dollar of earnings, but grows at a constant rate. The EITC phases in with the income tax, remains constant at its maximum amount, and then phases out.

The final component in constructing the budget constraint is the calculation of AFDC and Food Stamps benefits. For observations before OBRA81, AFDC benefits are computed according to the following formula:

$$B(s,w,H) = \max \{G(s) - C(w,H), 0 \} \quad \text{if } C(w,H) < N(s), \text{ and}$$

$$B(s,w,H) = 0 \quad \text{otherwise,}$$

where $G(s)$ is the state's payment standard for a family of size s, $N(s)$ is the state's needs standard[27] for a family of size s, and $C(w,H)$ is countable income, defined by:

$$C(w,H) = \max \{0.67*[wH - 30] - WD + N, 0 \},$$

where wH represents gross earnings, WD is the work-expense disregard, and N is countable unearned income. This includes asset income and all transfer income except Food Stamp benefits and the first $50 of child support payments.

[26]This figure was calculated for a woman with two children and zero taxable unearned income.

[27]In most states, the payment standard is smaller than the needs standard.

For observations after OBRA81, AFDC benefits are computed according to a slightly different formula:

$$B(s,w,H) = \max \{G(s) - C(w,H), 0 \} \quad \text{if } C(w,H) < N(s),$$

$$\text{if } wH + N < 1.5*N(s), \text{ if assets} < 1000$$

$$\text{and if } B > 10,$$

$$\text{and} \quad B(s,w,H) = 0 \quad \text{otherwise}.$$

This formula represents the addition of the gross-income eligibility test and the minimum paid benefit of $10 per month.

Countable income is also defined differently:

$$C(w,H) = \max \{0.89*[wH - 30 - WD] + N, 0 \}.$$

The benefit-reduction rate of 0.89 is a weighted average of the two values faced by a working recipient over the course of a year: four months at 0.67 and eight months at 1.00. This is a necessary approximation due to the lack of monthly employment data. Note also that after OBRA81, the work-expense disregard is applied before the thirty-and-a-third disregard (when the latter is available), resulting in a smaller amount disregarded.

State need and payment standards are taken from *Characteristics of State Plans* (U.S. DHHS, various years). Data on the mean work-expense disregard granted by year and state were not available, so national means by year were used. These were obtained from the 1994 *Green Book*. Since very few

recipients claim a child care disregard (1.3 percent of recipients in 1982), this disregard was not included.[28] The PSID does not include information on assets, but does include income from assets. This income was capitalized to yield an estimate of assets. Families reporting more than one vehicle were categorized as ineligible.

Food Stamp benefits were included for all AFDC recipients. These were calculated according to the following formula:

$$F(s,w,H) = max \{ FG(s) - FC(w,H), 0 \} ,$$

where $FG(s)$ is the Food Stamp guarantee standard for a family of size s. $FC(w,H)$ represents income countable against Food Stamps, and is defined by:

$$FC(w,H) = max \{0.3*[(wH*(1-EIC) + N - SD - RD], 0 \} ,$$

where EIC is the earned-income credit (18 percent), N is all unearned income, including AFDC benefits, SD is the standard deduction, and RD is the rent deduction. The Food Stamps program is administered federally, and hence there is no variation of parameters across states. Also, unlike AFDC benefits, Food Stamp benefits and disregards are indexed to inflation.[29]

---

[28]An alternative source of information on disregards by state is the set of "effective tax rates" estimated by Fraker, Moffitt, and Wolf (1986). However, these are somewhat problematic because (1) they represent average, rather than marginal, tax rates and hence misrepresent the budget constraint, (2) they are averaged over all recipients within a state, (3) many of the estimates are obtained from very small sample sizes, and (4) they may be subject to selection bias. There is concern among some researchers that these estimates of effective tax rates significantly underrepresent actual benefit-reduction rates.

[29]I thank Robert Moffitt for providing the Food Stamp parameters and formulas.

Figures 4a and 4b show how AFDC and Food Stamps benefits interact and decline with earnings for a median-wage worker in a state with median benefit levels and with two children. Note that part of this recipient's loss in AFDC benefits after OBRA81 is compensated by higher Food

Figure 4a

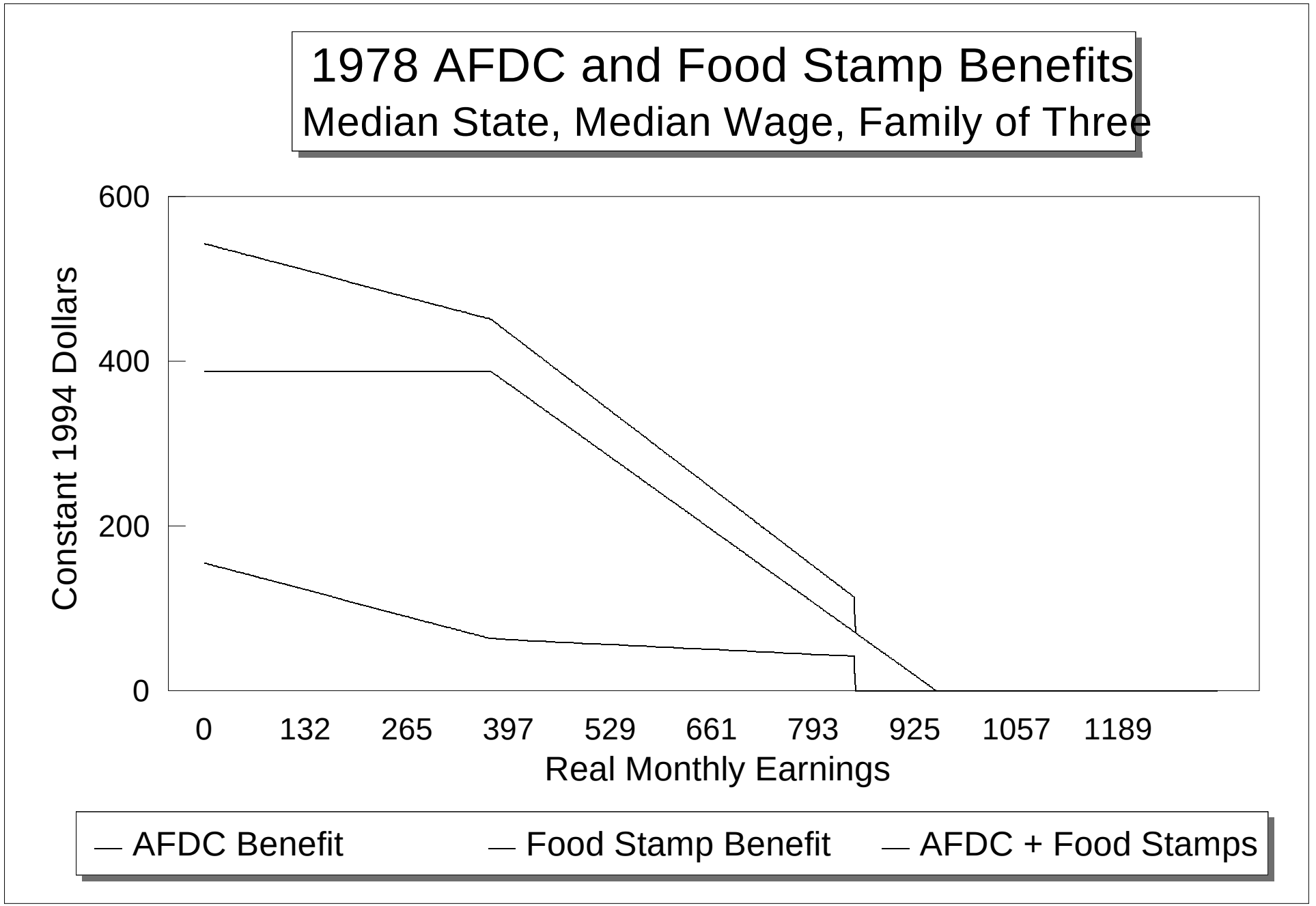
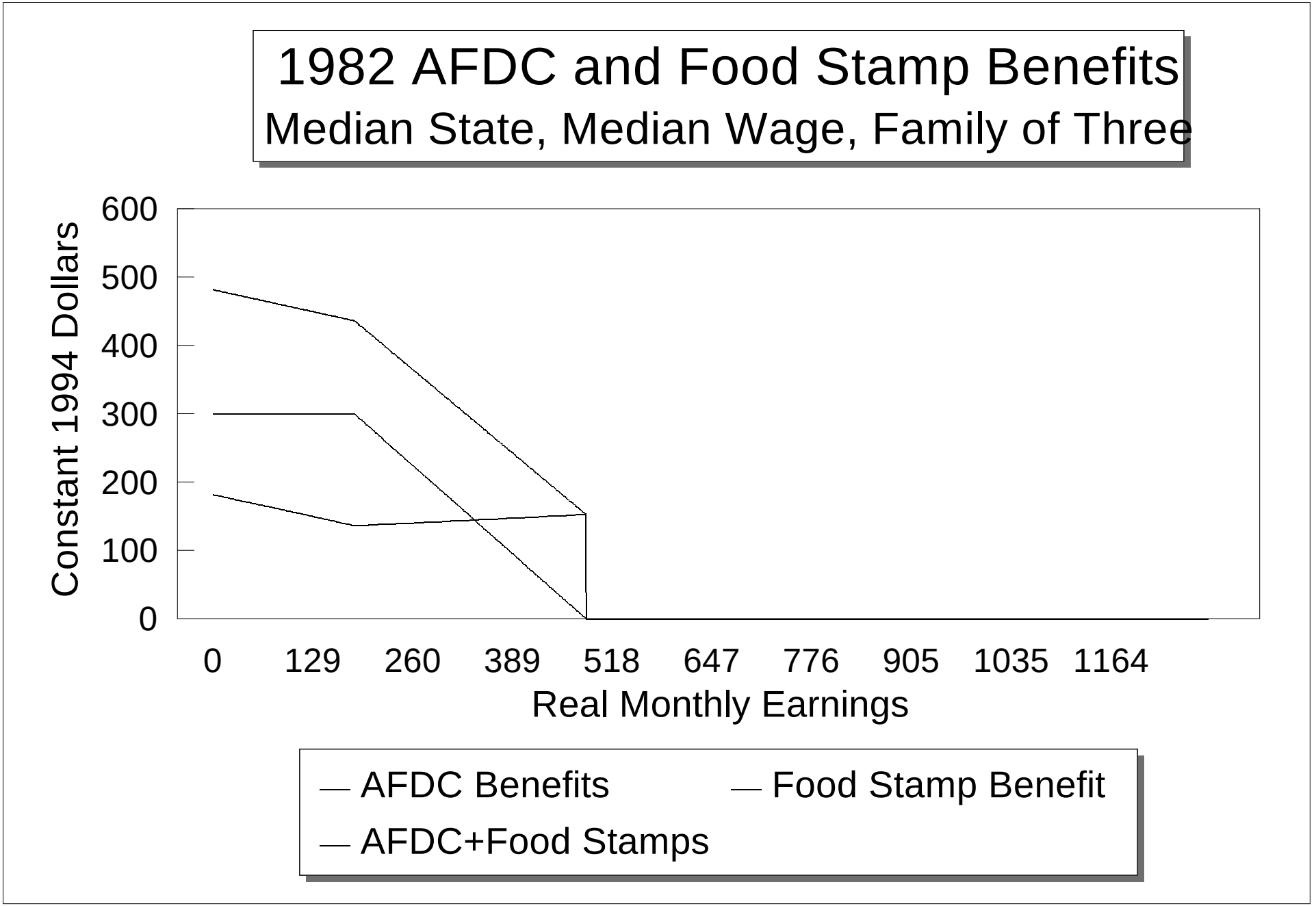

1978 AFDC and Food Stamp Benefits
Median State, Median Wage, Family of Three
600
400
200
0
Constant 1994 Dollars
0
132
265
397
529
661
793
925
1057
1189
Real Monthly Earnings
AFDC Benefit
Food Stamp Benefit
AFDC + Food Stamps

Figure 4b


1982 AFDC and Food Stamp Benefits
Median State, Median Wage, Family of Three
Constant 1994 Dollars
600
500
400
300
200
100
0
0
129
260
389
518
647
776
905
1035
1164
Real Monthly Earnings
AFDC Benefits
Food Stamp Benefit
AFDC+Food Stamps

Stamp benefits. This is a result of the interaction between the AFDC and Food Stamp benefit formulas.

Table 2 summarizes the budget constraint information by hours choice for median wage-earners in 1978 and 1982. A striking difference is the loss of AFDC eligibility for the median-wage part-time worker after OBRA81.

Descriptive Statistics from the Sample

Nonparametric evidence of the disincentive effect of OBRA81 is shown in Table 3, Panels A and B, which break down the empirical work-welfare distribution by regime. Panel A shows the distribution of participation and labor supply prior to the 1981 reforms, while Panel B shows the analogous distribution after the reforms. As mentioned above, the 1981 reforms restricted eligibility and reduced the payoff to working by adding a gross income test, capping work-expense and child-care expense disregards, and increasing the benefit-reduction rate to 100 percent after four consecutive months of work.[30]

As might be expected, the differences appear mostly in the second row, which represents the labor supply of AFDC participants. The differences are most easily seen in Figures 5a and 5b, which give histograms of observed choices by regime. The percentage of recipients working full time fell by over half, from 8.4 percent to just 3 percent, while the percentage working part time decreased about 25 percent, from 15.3 percent to 11.3 percent. The proportion not working increased by about 12 percent, from 76.3 percent to 85.6 percent. The overall proportion of the sample that participated in AFDC decreased about 8 percent, from 34 percent to 31 percent.

A common way of understanding the behavior of potential participants is to look at participation rates conditional on eligibility for benefits. While this statistic may be difficult to

[30]Again, it is important to note the post-OBRA81 period coincided with a major national recession, so not all of the change in Table 3 and Figure 5 is directly attributable to the 1981 law.

TABLE 2

Value of Budget Constraint at Median Wage
by Hours Choice, 1978 and 1982
(Constant 1994 Dollars)

	1978 Median Wage = $7.92			1982 Median Wage = $7.75		
	No Work	Part Time	Full Time	No Work	Part Time	Full Time
Earnings	0	634	1267	0	620	1240
Income Tax	0	0	-58	0	0	-79
Soc. Sec. Tax	0	-38	-77	0	-42	-83
EITC	0	0	39	0	0	56
AFDC	388	214	0	300	0	0
Food Stamps	155	52	0	182	0	0
Total	543	861	1171	482	578	1133

TABLE 3

Observed Distributions of Labor Supply and AFDC Participation
(Percentage of sample)

A. Pre-1981

	Labor Supply			
	Nonworkers	Part Time	Full Time	Row Total
Joint Distribution				
Off AFDC	8.3%	20.3%	37.3%	66.0%
On AFDC	26.0%	5.2%	2.9%	34.0%
Conditional on AFDC				
Off AFDC	12.6%	30.8%	56.6%	100.0%
On AFDC	76.3%	15.3%	8.4%	100.0%

B. Post-1981

	Labor Supply			
	Nonworkers	Part Time	Full Time	Row Total
Joint Distribution				
Off AFDC	11.3%	22.2%	35.4%	68.9%
On AFDC	26.7%	3.5%	0.9%	31.1%
Conditional on AFDC				
Off AFDC	16.4%	32.2%	51.4%	100.0%
On AFDC	85.6%	11.3%	3.0%	100.0%

Figure 5a

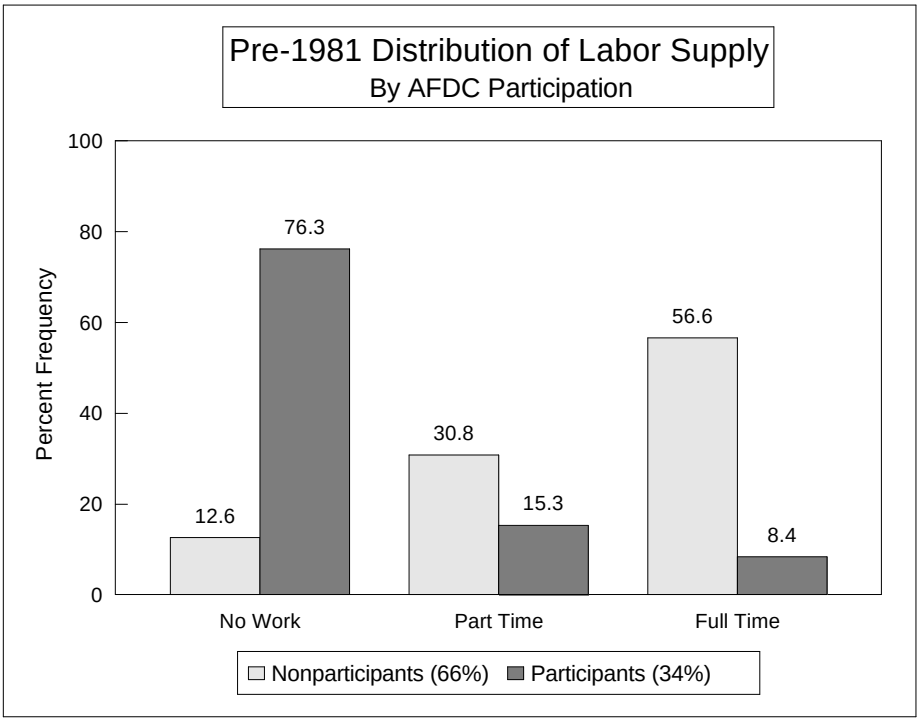
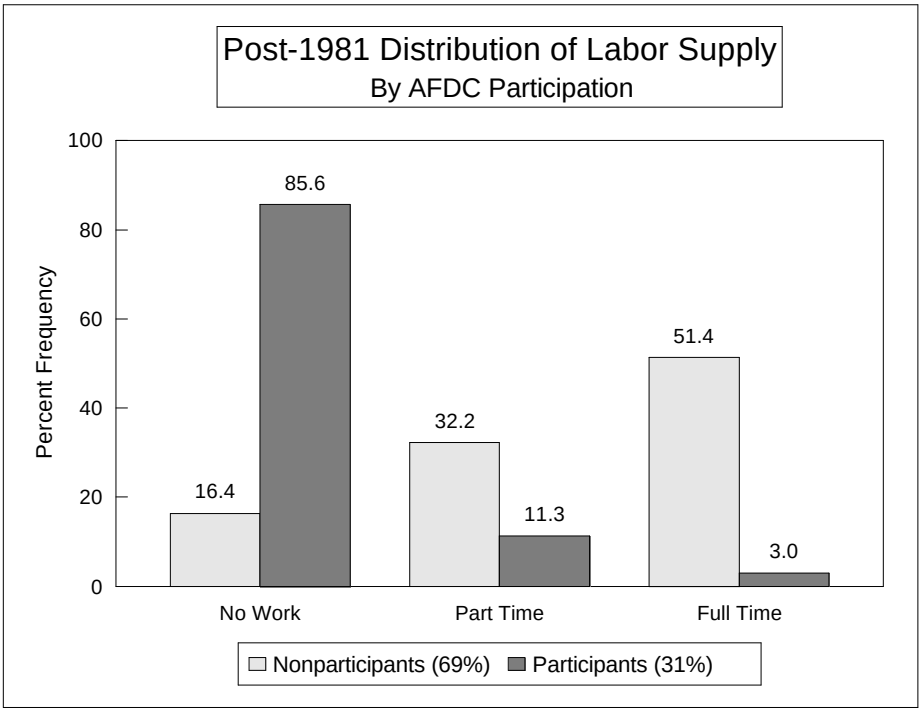


Figure 5b



interpret, since eligibility is a function of labor supply and hence is essentially endogenous, it is nevertheless often used in the literature. Table 4 shows participation rates among eligibles, taking their observed hours choice as given. This table shows again that eligibility was significantly restricted after 1981, falling from 53 percent of the sample to 32 percent of the sample, taking observed labor supply as given. However, it also suggests that the participation rate among eligibles increased, from 64 percent of eligibles before 1981 to 97 percent of eligibles after 1981.[31]

Table 5 shows the means of key variables used in the parametric analysis, by regime. Comparison of the means across regimes shows little change in socioeconomic characteristics. An exception is a 42 percent increase in the mean county unemployment rate, from 5.6 percent before 1981 to 8.0 percent after 1981. This coincides with the onset of the national 1982 recession. Real hourly wages, net part-time earnings, and net full-time earnings each fell 3 to 5 percent. Average (nonzero) transfer income, excluding AFDC and Food Stamps, fell 17 percent, from $396 to $329. Average (nonzero) welfare benefits for the three hours categories fell 12 to 16 percent.

The most striking changes are in the percentage of the sample who would be eligible for benefits at the three hours points. Even at zero hours the percentage eligible declines from 80 percent to 75 percent; this is mainly due to the new asset limits. At part-time work the percentage eligible falls drastically from 67 percent to 17 percent, and at full-time work virtually none of the sample remains eligible: the percentage eligible falls from 22 percent to just 1 percent. These drastic changes represent the combined effect of three major changes over the period 1978 to 1984: strict new eligibility rules, higher benefit-reduction rates, and lower real need and payment standards. The first two changes were implemented as part of the 1981 law, while the third change occurred concurrently

[31]The participation rate among eligibles at full-time work is extremely unreliable, since so few individuals are eligible at full-time work.

TABLE 4

AFDC Participation Rate among Eligibles, Taking Labor Supply as Given

	Labor Supply			
	No Work	Part Time	Full Time	All
Full Sample				
% Eligible	77	41	11	42
% Part | Eligible	96.1	45.2	44.5	77.4
Before 1981				
% Eligible	80	67	22	53.2
% Part | Eligible	96.8	31.7	32.4	64
After 1981				
% Eligible	75	17	1	32.3
% Part | Eligible	94.7	94.4	240.0[a]	96.5

[a]This result is unreliable due to small sample size. Only 5 individuals in this cell were predicted to be eligible, while 12 individuals reported AFDC.

TABLE 5
Means of Key Variables

	Full Sample	Pre-1981	Post-1981
Means of Choice Variables			
AFDC = 1	0.33	0.34	0.31
Nonparticipants			
Not Working=1	0.13	0.11	0.15
Part Time=1	0.33	0.32	0.33
Full Time=1	0.54	0.57	0.51
Participants			
Not Working=1	0.74	0.77	0.83
Part Time=1	0.19	0.21	0.14
Full Time=1	0.05	0.07	0.03
Means of Socioeconomic Variables			
# Kids	1.99	2.03	1.96
Child < 6	0.51	0.49	0.52
Age	32.71	32.82	32.61
Education	11.45	11.32	11.58
Nonwhite	0.77	0.75	0.78
Unemployment Rate	6.86	5.63	8.01
Means of Budget Constraint Variables (in constant 1994 $)			
Hourly wage	7.96	8.07	7.86
Monthly: (all means are exclusive of zeros)			
Part-Time Earnings, Net of Fed. Tax	591.83	602.09	582.27
Full-Time Earnings, Net of Fed. Tax	1141.05	1168.93	1115.09
Asset Income	209.22	239.16	180.34
Percent Nonzero	7%	7%	7%
Transfers (excludes AFDC & FS)	361.43	396.47	328.82
Percent Nonzero	53%	53%	53%
AFDC+FS Benefits at zero work	509.01	551.35	466.88
Percent Nonzero	77%	80%	75%
AFDC+FS Benefits at PT work	341.91	353.91	298.04
Percent Nonzero	41%	67%	17%
AFDC+FS Benefits at FT work	254.29	255.57	226.23
Percent Nonzero	11%	22%	1%

but indirectly, as state legislatures failed to increase nominal benefit values during a period of high inflation. The individual effects of these components will be discussed in the next section.

VI. ESTIMATION RESULTS AND SIMULATIONS

Results of the maximum likelihood estimation are shown in Table 6. Parameter estimates are mostly as expected. The utility of leisure (or distaste for work) has a positive intercept and increases with the presence of small children and the county unemployment rate. Older and better educated individuals have lower tastes for leisure, and hence are more likely to work. The effect of the number of children on the utility of leisure has the unexpected sign, but is imprecisely estimated. The disutility of AFDC participation has a positive intercept, and is large relative to the other participation utility parameters, indicating the presence of welfare stigma or transactions costs. The effect of education on the participation utility has the unexpected sign, but is very imprecisely estimated. Stigma or transactions costs are lower for nonwhite households, which is consistent with previous studies.

To test the fit and predictive power of the model, Table 7 compares the actual versus predicted distributions of labor supply and AFDC participation, using the full sample. The predictions were made using the estimated utility parameters from Table 6, and the appropriate benefit and eligibility rules.[32] The table indicates that overall, the model does reasonably well at predicting observed behavior. Three of the six predicted cell frequencies are within four percentage points of the actual cell frequencies. The model underpredicts non-AFDC nonworkers (4.6 percent predicted vs. 9.9 percent actual), overpredicts non-AFDC part-time work (26.0 percent predicted vs. 21.3 percent

[32]That is, the utility parameters themselves are assumed to stay constant over the entire period.

TABLE 6

Parameter Estimates

Variable	Leisure	Participation Cost
Constant	3.2840*	0.4593
	(0.1877)	(0.2481)
# Children	-0.0257	—
	(0.0207)	
Child < 6	0.2173*	—
	(0.0527)	
County Unemployment Rate	0.1204	—
	(0.0791)	
Age of Head	-0.1478*	—
	(0.0266)	
Education	-0.5150*	-0.0321
	(0.1114)	(0.2068)
Nonwhite	—	-0.1597
		(0.0953)
n = 2462		
log likelihood = - 4203.73		

Standard errors in parentheses.
*Statistically significant at the 5% level.

TABLE 7

Actual and Predicted Distributions of Labor Supply and AFDC Participation
(Percentage of sample)

	Labor Supply			
	Nonworkers	Part Time	Full Time	Row Total
Actual				
Off AFDC	9.9%	21.3%	36.3%	67.5%
On AFDC	26.3%	4.4%	1.9%	32.5%
Column Total	36.2%	25.6%	38.2%	100.0%
Predicted				
Off AFDC	4.6%	26.0%	32.6%	63.2%
On AFDC	34.0%	2.8%	0.0%	36.8%
Column Total	38.6%	28.8%	32.6%	100.0%

actual), and overpredicts AFDC nonworkers (34.0 percent predicted vs. 26.3 percent actual). The model slightly overpredicts AFDC participation: 36.8 percent predicted vs. 32.5 percent actual.

The estimated coefficients can be used to analyze the impacts of the 1981 reforms on participation and labor supply, and to simulate the effects of other policy changes. A particular advantage of the structural approach is that it allows the effects of the various changes imposed in 1981 to be decomposed. The 1981 legislation had two major impacts on AFDC rules: stricter eligibility rules and higher effective tax rates on earnings. At the same time, nearly every state's need and payment standards were declining in real terms. Individuals' behavior as recorded in the data is a function of all three of these variables. By holding two of the variables constant while allowing the third to change, the impact of each variable can be simulated separately.

Table 8 shows the results of this simulation. Each section of Table 8 shows the impact of a policy change on the AFDC participation rate and the labor supply choices of both recipients and nonrecipients. The impact on AFDC eligibility by labor-supply group is also given. Finally, the effect on government expenditures for AFDC, Food Stamp, and total benefits are reported in the three rightmost columns.

The first section shows the effect of subjecting the full sample to the pre-1981 environment. Under this benchmark scenario, recipients face an unrestricted thirty-and-a-third disregard of earnings, more generous eligibility standards, and real need and payments standards fixed at 1978 levels. In this environment, 47.4 percent of the sample would participate in AFDC, and 19 percent of recipients would choose to work part time. None of the sample would choose to work full time.

The isolated effect of the higher benefit-reduction rate is shown in the second section. This change by itself reduced AFDC participation slightly, and severely reduced the proportion of recipients who work, from 19 percent to just 2 percent. The effect of this change on AFDC eligibility is strong: the percentage of part-time workers eligible falls from 76 percent to 57 percent, and the

TABLE 8

Decomposed Effects of the 1981 Reforms on Labor Supply and AFDC Participation

	Effect on Behavior				Effect on Government Expenditures			
		Labor Supply Choice			Total % ch from bench	AFDC % ch from bench	FS % ch from bench	AFDC's share of total
	AFDC Choice	No Work	Part Time	Full Time				
Benchmark: Pre-OBRA81 Rules	off AFDC 52.6% of which:	8.3%	43.6%	48.1%				
(Fix BRR, Elig, Real Bens)	on AFDC 47.4% of which:	81.3%	18.7%	0.0%	0.0%	0.0%	0.0%	81%
	percent eligible for AFDC:	88%	76%	26%				
Change BRR Only	off AFDC 55.2% of which:	7.9%	42.1%	50.0%				
(Fix Eligibility, Real Benefits)	on AFDC 44.8% of which:	98.3%	1.7%	0.0%	1.6%	0.1%	7.9%	80%
	percent eligible for AFDC:	88%	57%	12%				
Change Eligibility Only	off AFDC 54.8% of which:	8.0%	42.9%	49.1%				
(Fix BRR, Real Benefits)	on AFDC 45.3% of which:	82.8%	17.2%	0.0%	-9.5%	-9.6%	-9.2%	81%
	percent eligible for AFDC:	80%	56%	15%				
OBRA81: Change BRR and Eligibility	off AFDC 57.1% of which:	7.7%	41.5%	50.9%				
(Fix Real Benefits)	on AFDC 42.9% of which:	98.5%	1.5%	0.0%	-8.1%	-9.1%	-3.4%	80%
	percent eligible for AFDC:	80%	49%	11%				
Change Real Benefits Only	off AFDC 62.4% of which:	7.4%	41.6%	51.1%				
(Fix BRR, Eligibility)	on AFDC 37.7% of which:	92.1%	7.9%	0.0%	-26.5%	-32.5%	-0.9%	75%
	percent eligible for AFDC:	83%	52%	14%				
Post-OBRA81 Environment	off AFDC 66.4% of which:	7.2%	41.0%	51.9%				
(Change BRR, Elig and Real Bens)	on AFDC 33.6% of which:	99.6%	0.5%	0.0%	-31.4%	-36.8%	-8.2%	75%
	percent eligible for AFDC:	76%	41%	6%				

percentage of eligible full-time workers falls from 26 percent to 12 percent. This change is also associated with a slight (1.6 percent) increase in government expenditures on benefits, mostly from higher Food Stamp benefits.

The remainder of the table can be interpreted in a similar fashion. A striking result from Table 8 is the strong effect of the decline in real benefit standards over the 1978 to 1984 period. Lower real needs standards reduce AFDC eligibility nearly as much as higher benefit-reduction rates and tighter eligibility standards combined. Moreover, the combination of lower real needs and payment standards reduced the participation rate in AFDC by *more* than the two OBRA81 changes combined. The lower real standards also provided a significant work disincentive in their own right, increasing the proportion of recipients who do not work from the benchmark of 81 percent to 92 percent. Finally, the lower real standards resulted in a 26.5 percent savings in welfare expenditures. This figure rises to 32.5 percent if Food Stamp benefits, which are indexed to inflation, are excluded. An important result is that for many recipients, the share of Food Stamps in total income increased as real AFDC benefits declined. Hence the Food Stamps program played an important role over this period in preventing the well-being of welfare recipients from eroding more than it did.

The structural coefficients can also be used to predict the impacts of new policy changes. Table 9 shows the results of several simulations of hypothetical policy changes. The first two simulations in Table 9 show the effect of cutting needs and payment standards by 50 percent each. The lower needs standard significantly reduces AFDC eligibility for workers, but has a surprisingly small effect on both AFDC participation and labor supply. The same cut in payment standards, however, produces major changes. The effect on AFDC eligibility is only slightly stronger than it was for the reduction in needs standards. But AFDC participation falls by nearly half, and working recipiency nearly doubles. This suggests that individuals respond much more strongly to the payment standard than the need standard. A significant proportion respond to lower payment standards by

TABLE 9

Simulated Effects of the Hypothetical Policy Changes on Labor Supply and AFDC Participation

	Effect on Behavior				Effect on Government Expenditures			
		Labor Supply Choice			Total % ch from bench	AFDC % ch from bench	FS % ch from bench	AFDC's share of total
	AFDC Choice	No Work	Part Time	Full Time				
Benchmark: Pre-OBRA81 Rules	off AFDC 52.6% of which:	8.3%	43.6%	48.1%				
	on AFDC 47.4% of which:	81.3%	18.7%	0.0%	0.0%	0.0%	0.0%	81%
	percent eligible for AFDC:	88%	76%	26%				
Cut Needs Standards 50%	off AFDC 54.5% of which:	8.4%	44.8%	46.8%				
	on AFDC 45.5% of which:	81.3%	18.8%	0.0%	-8.8%	-7.8%	-13.1%	82%
	percent eligible for AFDC:	78%	58%	9%				
Cut Payment Standards 50%	off AFDC 75.6% of which:	6.1%	38.8%	55.1%				
	on AFDC 24.4% of which:	66.6%	33.4%	0.0%	-68.9%	-78.0%	-29.6%	57%
	percent eligible for AFDC:	74%	47%	6%				
Set BRR to 75%	off AFDC 54.6% of which:	8.0%	42.4%	49.5%				
	on AFDC 45.4% of which:	92.5%	7.5%	0.0%	0.8%	-0.4%	5.6%	80%
	percent eligible for AFDC:	88%	69%	20%				
Set BRR to 50%	off AFDC 44.9% of which:	9.8%	48.4%	41.9%				
	on AFDC 55.1% of which:	49.3%	50.7%	0.0%	8.4%	14.3%	-16.9%	86%
	percent eligible for AFDC:	88%	84%	46%				
Set BRR to 33%	off AFDC 36.0% of which:	12.0%	53.7%	34.3%				
	on AFDC 64.0% of which:	34.2%	65.8%	0.0%	30.6%	43.2%	-23.4%	89%
	percent eligible for AFDC:	88%	89%	74%				

(table continues)

TABLE 9, continued

	Effect on Behavior				Effect on Government Expenditures			
		Labor Supply Choice			Total % ch from bench	AFDC % ch from bench	FS % ch from bench	AFDC's share of total
	AFDC Choice	No Work	Part Time	Full Time				
Benchmark: Pre-OBRA81 Rules	off AFDC 52.6% of which:	8.3%	43.6%	48.1%				
	on AFDC 47.4% of which:	81.3%	18.7%	0.0%	0.0%	0.0%	0.0%	81%
	percent eligible for AFDC:	88%	76%	26%				
Set Child Cap at Two	off AFDC 57.5% of which:	7.8%	43.0%	49.2%				
	on AFDC 42.5% of which:	77.6%	22.4%	0.0%	-20.5%	-19.1%	-26.6%	83%
	percent eligible for AFDC:	86%	74%	23%				
Impose $5.25 Minimum Wage	off AFDC 53.2% of which:	8.0%	44.1%	47.9%				
	on AFDC 46.8% of which:	80.2%	19.8%	0.0%	-1.8%	-1.5%	-3.2%	81%
	percent eligible for AFDC:	88%	75%	24%				
Provide 10% Wage Subsidy	off AFDC 60.0% of which:	6.2%	44.9%	48.9%				
	on AFDC 40.0% of which:	81.5%	18.5%	0.0%	13.4%[a]	-15.6%	-14.7%	60%
	percent eligible for AFDC:	88%	70%	20%				
Provide 50% Wage Subsidy	off AFDC 77.3% of which:	2.9%	58.6%	38.5%				
	on AFDC 22.7% of which:	86.2%	13.8%	0.0%	115.8%[a]	-51.6%	-47.3%	18%
	percent eligible for AFDC:	88%	47%	7%				

[a]Includes the cost of the subsidy.

leaving AFDC, while another significant proportion respond by increasing work effort to offset lower benefits.

The bottom three sections of Table 9 demonstrate the effect of changing the benefit-reduction rate to values that states have recently considered. Progressively lower rates result in progressively higher AFDC eligibility and AFDC participation. Moreover, lower tax rates encourage working recipiency: at a benefit-reduction rate of 33 percent, fully two-thirds of recipients choose to work. The downside to lower rates is the effect on expenditures for benefits: lowering the rate to 33 percent would increase expenditures on AFDC benefits by 43 percent. While this would be partly offset by lower Food Stamp expenditures, the net increase in expenditures would still be 31 percent. The effect of the benefit-reduction rate on AFDC participation and working recipiency is illustrated in Figure 6. Figure 7 shows the net effect of the benefit-reduction rate on the labor supply of female heads of household. The figure shows that increased work among AFDC recipients who face lower benefit-reduction rates is offset by lower work among women drawn onto AFDC. Hence the net effect of the benefit-reduction rate on the labor supply of female heads of household is quite small.

Several states recently have proposed a “child cap” that would remove the increase in the AFDC benefit associated with additional children. A child cap of two children reduces participation slightly, and increases working recipiency as some participants increase labor supply to offset lost benefits. Imposing a minimum wage of $5.25 reduces participation and increases working recipiency very slightly.

Providing a wage subsidy of 10 percent to all female heads of household with children is successful in reducing participation from 47 percent to 40 percent, but it has virtually no effect on the labor supply of recipients. On the expenditure side, while resulting in a 16 percent savings in benefit expenditures, the cost of the subsidy itself increases net expenditures by 13 percent.

Figure 6

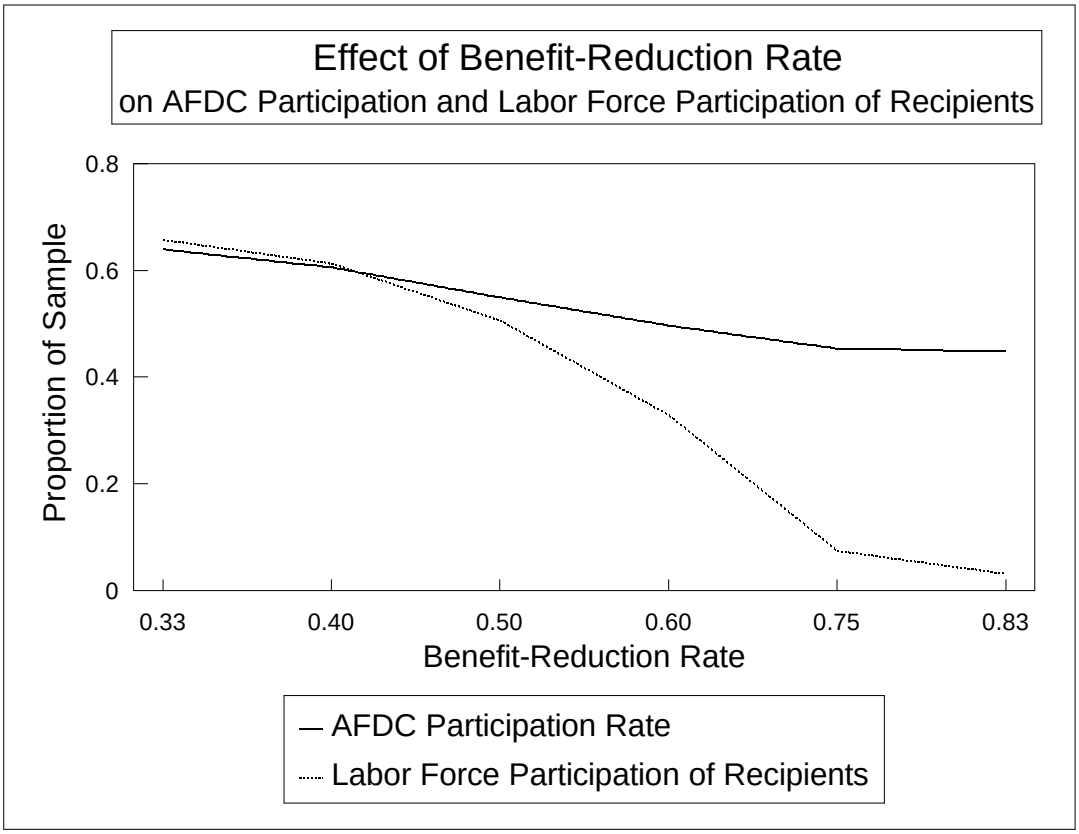
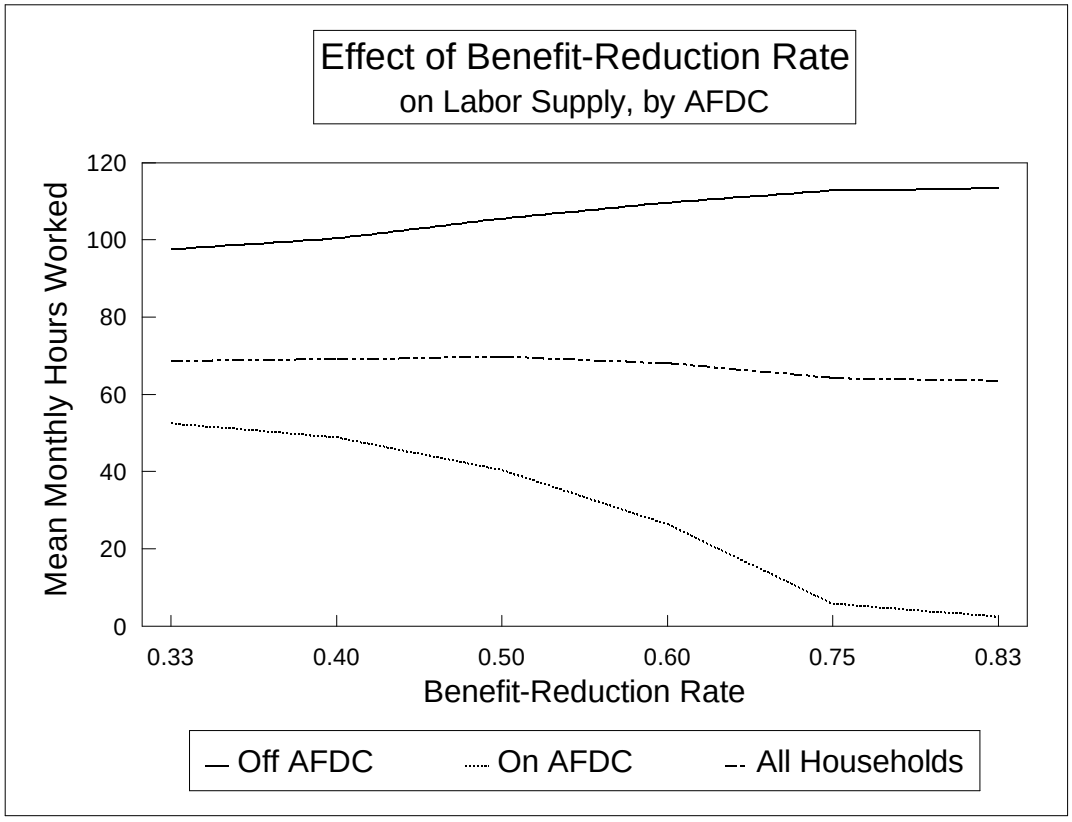


Figure 7



Providing a more ambitious wage subsidy of 50 percent has very dramatic results on AFDC participation, but less successful effects on labor supply and expenditures. AFDC participation falls by more than half, from 47 percent to 23 percent. But working recipiency falls from 19 percent to 14 percent, as fewer recipients remain eligible with the higher wages. This effect could be reduced by disregarding the subsidized portion of wages, but this would naturally entail even higher expenditures. Even without disregarding subsidized wages, the resulting savings of 52 percent of AFDC expenditures is not enough to offset the cost of paying the subsidy, producing a net increase in expenditures of 116 percent.

Table 9 shows varying responsiveness in AFDC participation and labor-supply choices to different policy tools. This information is summarized in Table 10, which shows measures of responsiveness by broad policy category. The AFDC participation response is defined as the percent change in the participation rate for a 1 percent change in the policy parameter. The labor-supply response is measured by the percent change in the proportion of recipients who work for a 1 percent change in the policy parameter.

Both participation and labor-supply choices were surprisingly unresponsive to changes in needs standards. But both choices were quite responsive to changes in payment standards. Perhaps most relevant for states considering new reforms is the result that manipulation of the benefit-reduction rate seems quite powerful in altering both work and welfare decisions. Working recipiency is greatly encouraged by lower tax rates, but at a cost of higher expenditures on benefits. Finally, the AFDC participation choice is quite responsive to wage levels, but increasing wages has only small effects on working recipiency in the absence of higher disregards.

TABLE 10

Simulated Responsiveness of AFDC Participation and Labor Supply

	AFDC Participation Response[a]	Working Recipiency Response[b]
Needs Standards	0.08	0.01
Payment Standards	0.97	1.57
Effective Tax Rates	-0.64	-6.74
Real Wages	-1.56	-0.11

[a](% change in participation)/(% change in x).

[b](% change in p) / (% change in x), where p = proportion of participants who work.

VII. CONCLUSIONS

This paper has developed an analytically tractable structural model of AFDC participation and labor supply. The model was estimated on a sample of female heads of household over the years 1978 to 1984, a period which included a major change in AFDC payment and eligibility rules. The changes imposed by the 1981 OBRA were accounted for explicitly in the budget set, as were declining real benefit standards, changes in the federal tax system, and the interaction of AFDC and Food Stamps. Estimated utility parameters were used to decompose the effects of the 1981 reforms. The overall effect of the legislation was to reduce participation by about 8 percent and cut the incidence of working recipiency by more than 40 percent.

Simulations suggest that lower real needs and payment standards reduced AFDC eligibility and participation by *more* than the two OBRA81 changes combined. The lower real standards also provided a significant work disincentive in their own right, increasing the proportion of recipients who do not work from the benchmark of 81 percent up to 92 percent. Finally, the lower real standards resulted in a 26.5 percent savings in welfare expenditures. This figure rises to 32.5 percent if Food Stamp benefits, which are indexed to inflation, are excluded. An important result is that for many recipients, the share of Food Stamps in total income increased as real AFDC benefits declined. Hence the Food Stamps program played an important role over this period in preventing the well-being of welfare recipients from eroding more than it did.

Estimated utility parameters were also used to simulate the effects of hypothetical policy changes. Both participation and labor-supply choices are quite responsive to changes in payment standards, holding needs standards fixed. Lower payment standards cause some recipients to leave welfare and others to increase their work effort. The benefit-reduction rate is quite powerful in altering work and welfare decisions. Working recipiency is significantly encouraged by lower tax rates, but this is offset by lower

labor supply among women drawn on to AFDC. Finally, the AFDC participation choice is quite responsive to wage levels, but increasing wages would have only small effects on working recipiency in the absence of higher disregards.

References

Blank, Rebecca, and Patricia Ruggles. 1996. "When Do Women Use AFDC and Food Stamps? The Dynamics of Eligibility versus Participation." *Journal of Human Resources* 31: 57–89.

Danziger, Sheldon, Robert Haveman, and Robert Plotnick. 1981. "How Income Transfers Affect Work, Savings, and the Income Distribution." *Journal of Economic Literature* 19: 975–1028.

Feaster, Dan, Peter Gottschalk, and George Jakubson. 1987. "The Impact of 1981 AFDC Reforms on Months Worked and Welfare Duration." *Journal of Human Resources* 22: 542–550.

Fraker, Thomas, and Robert Moffitt. 1988. "The Effect of Food Stamps on Labor Supply: A Bivariate Selection Model." *Journal of Public Economics* 35: 1–24.

Fraker, Thomas, Robert Moffitt, and Douglas Wolf. 1985. "Effective Tax Rates and Guarantees in the AFDC Program." *Journal of Human Resources* 20: 251–263.

Hoynes, Hilary. 1996. "Welfare Transfers in Two-Parent Families: Labor Supply and Welfare Participation Under AFDC-UP." *Econometrica* 64: 295–332.

Hutchens, Robert. 1986. "The Effects of the Omnibus Budget Reconciliation Act of 1981 on AFDC Recipients: A Review of the Studies." *Research in Labor Economics*, vol. 8. R. Ehrenberg, ed. Greenwich, CT: JAI Press.

Keane, Michael, and Robert Moffitt. 1996. "A Structural Model of Multiple Welfare Program Participation and Labor Supply." University of Wisconsin–Madison, Institute for Research on Poverty, Discussion Paper #1080-96.

Moffitt, Robert. 1983. "An Economic Model of Welfare Stigma." *American Economic Review* 73: 1023–1035.

Moffitt, Robert. 1986. "Work Incentives in the AFDC System: An Analysis of the 1981 Reforms." *American Economic Review* 70: 219–223.

Moffitt, Robert. 1992. "Incentive Effects of the U.S. Welfare System: A Review." *Journal of Economic Literature* 30: 1–61.

Pechman, Joseph. 1987. *Federal Tax Policy*, 5th edition. Washington, D.C.: Brookings Institute.

Savner, Steve, and Mark Greenberg. 1995. *The CLASP Guide to Welfare Waivers: 1992–1995*. Washington, D.C.: Center for Law and Social Policy.

U.S. Department of Health and Human Services. Various years. *Characteristics of State Plans for Aid to Families with Dependent Children*. Washington, D.C.: U.S. Government Printing Office.

U.S. House of Representatives. 1994. *Overview of Entitlement Programs*, 14th edition (Green Book). Washington, D.C.: U.S. Government Printing Office.

Van Soest, Arthur. 1995. "Structural Models of Family Labor Supply: A Discrete Choice Approach." *Journal of Human Resources* 30: 63–88.