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WELFARE TRANSFERS IN TWO-PARENT FAMILIES: LABOR SUPPLY AND WELFARE PARTICIPATION UNDER AFDC-UP

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This paper examines the effect of cash transfers and food stamp benefits on family labor supply and welfare participation among two-parent families. The Aid to Families with Dependent Children—Unemployed Parent Program has provided cash benefits to two-parent households since 1961. Despite recent expansions, little is known about the program's effect on labor supply and welfare participation. I develop a model of family labor supply in which hours of work for the husband and wife are chosen to maximize family utility subject to a family budget constraint accounting for AFDC-UP benefits and other tax and transfer programs. The husband's and wife's labor supply decisions are restricted to no work, part-time work, and full-time work. Maximum likelihood techniques are used to estimate parameters of the underlying hours of work and welfare participation equations. The estimates are used to determine the magnitude of the work disincentive effects of the AFDC-UP program, and to simulate the effects of changes in AFDC-UP benefit and eligibility rules on family labor supply and welfare participation. The results suggest that labor supply and welfare participation among two-parent families are highly responsive to changes in the benefit structure under the AFDC-UP program.

KEYWORDS: Welfare programs, disincentive effects, family labor supply, nonlinear budget constraints.

1. INTRODUCTION

IN THE PAST TWO DECADES, many researchers have analyzed the effects of government transfer programs on labor supply behavior among the low income population. Most of the earlier work focused on estimating the work disincentive effects of Aid to Families with Dependent Children (AFDC), the largest means tested welfare program providing cash benefits to the low-income population. More recently, this literature has been extended to study the impact of the combination of cash benefits and in-kind benefits on labor supply behavior (Moffitt (1992)). While this literature has provided insights into how the U.S. welfare system affects the low-income population, it focuses *solely* on female-heads of household as the potential welfare recipient population. Although female-headed households represent most welfare recipients, benefits are available to eligible two-parent households through the Aid to Families with Dependent Children—Unemployed Parent program (AFDC-UP). Despite recent interest little is known about the program's effect on labor supply and welfare

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participation among intact families.[2] This paper uses data from the Survey of Income and Program Participation to analyze family labor supply and welfare participation in the presence of the AFDC-UP program.

Since AFDC was established in 1935, it has provided benefits to needy children in single parent households (typically female-headed households). However, in a 1961 anti-recession measure, the federal government authorized states to extend benefits to two-parent households where the father was unemployed. The program for two-parent families (AFDC-UP) soon became permanent and, as of fiscal year 1988, twenty-six states offered AFDC-UP programs with a combined caseload of over 225,000 households serving almost one million recipients.

Interest in the AFDC-UP program has increased because of recent congressional legislation. There is growing evidence that the historical practice of targeting assistance to children in single-parent families has contributed to the dramatic increase in the incidence of female-headed households among the low-income population (Moffitt (1992)). Partially in response to this trend, Congress passed the Family Support Act of 1988 (FSA) that required *all* states to extend AFDC benefits to two-parent households by October 1990. This law marks a major change in U.S. welfare policy, from the previous focus on targeting resources to female-headed households.

This paper estimates the effect of the AFDC-UP program on after-tax and transfer income, labor supply, and welfare participation among two-parent families. An issue of central importance in analyzing transfer programs is the extent to which the program reduces work effort. The possibility of self selection into welfare implies that we cannot simply attribute the difference in hours worked among participants and nonparticipants to be the result of the welfare program. Here, work disincentive effects of the AFDC-UP program are constructed by comparing hours of work among participants in the program to the hours they *would have worked* in absence of the program. These estimates are then used to determine how much family income would change if the AFDC-UP program were eliminated. The paper also examines how changes in eligibility rules and program benefits affect AFDC-UP participation and family labor supply. In particular, the analysis contains estimates for the effects of changes in benefits, implicit tax rates, and work restrictions on labor supply and welfare participation.

I develop a static model of family labor supply and welfare participation in which hours of work for the husband and the wife and welfare participation are chosen to maximize family utility subject to a budget constraint. The budget constraint accounts for AFDC benefits, payroll taxes, federal income taxes, and the Earned Income Tax Credit. A high implicit tax rate on earnings in the AFDC-UP program induces a nonconvex kink in the family budget constraint that can cause discontinuous labor supply responses to changes in program

[2] An exception is Hosek (1980) who uses a cross-section of recipients and nonrecipients to study participation in the AFDC-UP program.

parameters. Additional taxes introduce further nonlinearities in the budget constraint.

Given the complexity of the two-earner problem in the presence of a kinked budget constraint, the problem is simplified by restricting the labor supply choice of the husband and the wife to that of full-time work, part-time work, and no work.[3] Empirical feasibility is achieved from this discrete formulation of the hours of work decision and by assuming a discrete distribution for the unobserved heterogeneity in preferences for work. The resulting discrete state model is estimated using maximum likelihood techniques. The model is estimated using data on two-parent families with children drawn from the 1984 Panel of the Survey of Income and Program Participation (SIPP).

The results suggest that labor supply and welfare participation among two-parent households are highly responsive to changes in the benefit structure under the AFDC-UP program. The estimated work disincentive effects of the program and sensitivity of welfare participation are greater than that found for the female-headed population under the AFDC program. In particular, changes in the benefit level and, to a lesser extent, changes in the implicit tax rate on earnings, significantly affect participation in the AFDC-UP program. The elasticity of participation in the UP program with respect to benefits is about 0.9. In addition, controlling for the existence of self-selection into welfare, the work disincentive effects for current recipients are estimated to be about 46 hours per month for husbands and 34 hours per month for wives. Among all two-parent families, the work incentive effects are much smaller at 4 hours for husbands and 3 for wives. Despite the large estimated work disincentive effects, upon elimination of the AFDC-UP program, family income among welfare recipients falls by about ten percent. As a result, most AFDC-UP families would still be eligible for welfare in the absence of the program.

The remainder of this paper proceeds as follows. Section 2 discusses the background of the AFDC-UP program as well as the program's eligibility and benefits rules. Section 3 presents the economic model. Section 4 presents the empirical implementation of the economic model. Section 5 discusses the data set used for the analysis. Section 6 presents the results from the model estimation and Section 7 presents the policy simulations. Section 8 provides concluding remarks.

2. THE AID TO FAMILIES WITH DEPENDENT CHILDREN—UNEMPLOYED PARENT PROGRAM: BACKGROUND, ELIGIBILITY, AND BENEFITS

The Aid to Families with Dependent Children Program was established in 1935 as part of the Social Security Act.[4] Benefits were provided to needy

[3]This approach has been used in recent studies of multiple program participation and labor supply (such as Fraker and Moffitt (1988) and Moffitt and Wolfe (1992)).

[4]This section draws on Congressional Research Service (1987), Government Accounting Office (1992a) and Government Accounting Office (1992b).

children who were deprived of support due to death, incapacity, or absence of a parent. In 1961, states were given the authority to extend benefits to children in families with "jobless fathers." The program was extended as an anti-recessionary measure and was intended to be temporary, but the Aid to Families with Dependent Children Unemployed Fathers (AFDC-UF) program was made permanent in 1967. In 1981, as part of the Omnibus Budget and Reconciliation Act, the program was extended further to include two-parent families where either the husband or wife was unemployed. The program was then changed to the AFDC Unemployed Parent (AFDC-UP) program. The AFDC-UP caseload has grown considerably in the past 30 years. Monthly participation in the program increased from 39,000 families in 1961 to 213,000 families in 1987 when benefits paid out to UP families totaled over 1.5 billion dollars. The UP population is heavily concentrated, and almost three-quarters of the 1990 caseload is accounted for by five states: California (40%), Michigan (12%), Ohio (11%), New York (5%), and Illinois (5%). The most significant piece of legislation with respect to the AFDC-UP program was contained in the Family Support Act, passed by Congress in 1988. The Family Support Act requires that all states establish AFDC-UP programs by October 1990. While only half the AFDC jurisdictions had AFDC-UP programs prior to passage of the Family Support Act, these states tend to be the high benefit, high caseload states. Furthermore total AFDC caseload in states with UP programs accounted for seventy percent of the total AFDC caseload.

2.1. *Current Eligibility Rules*

Categorical eligibility for AFDC requires that the household must contain at least one child who is less than 18, and must have sufficiently low income and asset levels. The asset test requires that the equity value of real and personal property, excluding home equity and up to $1500 equity in one automobile, not exceed $1000. The income test requires that net family income not exceed a maximum benefit level (which varies by family size and state of residence). Net income includes all sources of unearned income as well as countable earned income. Countable earned income includes all sources of earned income less an earned income disregard (standard deduction for work expenses) and a child care deduction. These deductions are significant, with a maximum child care deduction of $175 per month per child and maximum earned income disregard of $120 per month in 1990. Like other AFDC recipients, households receiving cash benefits under AFDC-UP are categorically eligible for food stamp benefits and government financed medical services under the Medicaid program.

AFDC-UP families must satisfy two supplementary eligibility requirements. The work history requirement states that at least one parent must display "significant" attachment to the labor force. Significant attachment is typically satisfied if the worker was employed and earned at least $50 in at least six of the last thirteen calendar quarters, or was eligible to receive unemployment compensation sometime in the last year. The earner that satisfies this work history requirement is termed the *principal earner*.[5] While receiving AFDC-UP benefits, the principal earner is restricted to work no more than 100 hours per month. By imposing the 100-hour work limit, the AFDC-UP program is providing benefits to children in families with an "unemployed parent."

This minor work history requirement implies that all AFDC-UP families contain at least one parent with labor market experience. This might have significant effects on the composition of the recipient population. Program data displayed in Table I shows that characteristics of AFDC-UP recipients are quite different from female-headed households receiving AFDC. UP families tend to have older parents and contain more children. Second, while over 60 percent of female-headed households are minorities, about 35 percent of AFDC-UP fami-

TABLE I

CHARACTERISTICS OF FAMILIES RECEIVING AFDC BENEFITS
COMPARISON OF UP FAMILIES WITH FEMALE-HEADED FAMILIES, FY1987

	Female-Headed Families	Unemployed Parent Families
Number of Families (1000's)	3,089	226
Average Monthly Payment (1987 $)	$351	$548
Average # of Persons in Assistance Group	2.9	4.6
Average # of Children	1.9	2.5
Race of Recipient Head		
White	38.9%	64.2%
Black	44.6	9.4
Other	16.5	26.4
Age of Adult Female Recipient		
Less than 21	15.4%	10.1%
22–29	41.5	40.5
30–39	30.6	35.6
40 or more	12.6	13.9
Age of Youngest Child		
< 3	39.9%	49.6%
3 to 5	22.9	22.1
6 or more	37.2	28.3
Housing Tenure Type		
Renter	72.2%	73.6%
Owner	3.9	11.1
Public Housing/Subsidy	23.9	15.3
Percent with Mother Working	5.8%	6.2%
Percent with Non-AFDC Income	19.4%	30.5%
Percent with Earned Income	7.8%	21.5%
Percent with Countable Assets	17.9%	40.9%
Percent Receiving Food Stamp Benefits	83.5%	95.1%

Source: U.S. House of Representatives (1988), Table 26, pp. 569–570 and U.S. Department of Health and Human Services (1987).

[5] If both parents satisfy the work history requirement the parent with higher earnings over the last twenty-four months is the principal earner.

lies are nonwhite. Further, UP families are more likely to have both unearned and earned income, and are more than twice as likely to have any countable assets.[6]

2.2. *AFDC-UP Benefits*

Family benefits are calculated as the difference between the maximum benefit level and net family income. Each state determines its own benefit level, which typically varies by family size. The benefit levels vary tremendously across states. For example, in 1989 maximum benefits for a family of four range from $824 in California to $248 in South Carolina. Net family income includes all unearned income plus countable earned income. A standard deduction for work expenses (earned income disregard) is deducted from earnings in calculating benefit payments. Further, in the first four months of working while on AFDC, one-third of earnings is also deductible. Thus for every $1 increase in earned income over the standard deduction, benefits are reduced by 67 cents. After four months the one-third deduction is discontinued and benefits are reduced one-to-one with an increase in earnings. Thus the implicit tax rate on earned income for AFDC recipients can be as high as 100 percent.[7] The maximum benefit level and the tax rate combine to create a breakeven level of income at which point benefits are zero. Below the breakeven point the household can receive positive benefits and above the breakeven level the household is not eligible. This high tax rate on earnings while on welfare, coupled with a relatively low tax rate above the breakeven point creates a nonconvex kink at the breakeven level of income.

3. ECONOMIC MODEL OF FAMILY LABOR SUPPLY AND WELFARE PARTICIPATION

I employ a static model of family labor supply in which hours of work for the husband and wife and welfare participation are chosen to maximize family utility subject to a family budget constraint incorporating tax and transfer programs. Though similar models have been used to examine the effect of taxes and transfers on the labor supply in the single earner context, a methodological contribution of this paper is to consider the two-earner case. Most empirical studies of family labor supply in the presence of taxes and transfers limit the sample to working couples, thus bypassing the issue of labor force participation. Empirical studies that model joint labor supply allowing for nonworking spouse(s)

[6] These differences between two-parent and single parent AFDC recipients could be due to cross-state differences in family characteristics and benefit levels. For instance, the higher average benefits evident among AFDC-UP families can be accounted for not only by larger family sizes but also by the greater propensity to reside in relatively generous benefit states.

[7] Due to child care and work deductions the effective tax rate that households face is often much lower than the statutory rate of 100 percent. Participation in other programs such as the food stamp program can further increase the implicit tax rate.

have not accounted for the endogeneity of the tax system.[8] A notable exception is Hausman and Ruud (1984) but in their model the only source of stochastic variation is through measurement error in hours of work, and heterogeneity of preferences is not modeled.

3.1. *Family Utility*

Family utility is assumed to be a function of four arguments: husband's hours of work (h_h), wife's hours of work (h_w), family consumption (C), and participation in the AFDC-UP program (δ_p equals one if the family participates in AFDC-UP).[9] The utility function is assumed to be increasing in consumption, and decreasing with respect to its remaining arguments. The disutility from welfare participation is assumed to represent nonmonetary costs such as transactions costs or "stigma" of welfare receipt, and is included to account for nonparticipation among eligible families. Including welfare participation as an argument in the utility function rationalizes the observed nonparticipation of eligible families.[10]

Following Moffitt (1983), disutility from welfare participation is assumed to be separable,

$$\overline{U}(h_h, h_w, C, \delta_p) = U(h_h, h_w, C) - \phi\delta_p. \tag{3.1}$$

The disutility affects the decision to participate in AFDC-UP, but not the labor force decision conditional on welfare receipt.

The utility function is assumed to be Stone-Geary:

$$U(h_h, h_w, C) = \beta_h \log(\gamma_h - h_h) + \beta_w \log(\gamma_w - h_w) + \beta_c \log(C - \gamma_c), \tag{3.2}$$

where

$$\begin{aligned} &\gamma_i - h_i > 0, \qquad i = h, w, \\ &C - \gamma_c > 0, \\ &0 < \beta_i < 1, \qquad i = h, w, c, \quad \text{and} \\ &\beta_h + \beta_w + \beta_c = 1. \end{aligned}$$

[8] All of the family labor supply studies surveyed in McElroy (1981) and Killingsworth (1983) are based on samples restricted to households in which both spouses work. Ransom (1987) estimates a joint labor supply model incorporating labor force participation but ignores the endogeneity of net wage and virtual income measures.

[9] An alternative would be a household bargaining model (McElroy (1990)). There are several reasons why the bargaining approach is problematic, and perhaps inappropriate, to implement in this application. First, an important empirical test of bargaining models is whether the husband's and wife's nonlabor income can be pooled. Here, the primary form of nonlabor income is AFDC-UP benefits, the receipt of which requires family coordination. Second, threat points for each of the parents are usually defined as the maximum utility if the union disintegrates. Determining which parent receives the children in the event of the separation is critical in the current application because it affects the availability of AFDC benefits for the single parent.

[10] This approach was introduced by Moffitt (1983). In the SIPP data twenty percent of the families that satisfy all requirements for AFDC-UP are not participating in the program.

The adding up condition on the β's is an arbitrary normalization of the utility function. The β's are assumed to be nonnegative to ensure that utility is increasing in consumption and decreasing in hours worked by the husband and the wife. The β's in the Stone-Geary model have the interpretation of marginal propensity to consume nonmarket time (β_h, β_w) or consumption goods (β_c) out of nonlabor income. For example, if nonlabor income increases by a dollar, the husband will increase the value of nonmarket time consumed by β_h (or equivalently decrease the value of work effort by β_h) and the wife will increase the value of nonmarket time consumed by β_w. The remainder is consumed in market goods, β_c. γ_h and γ_w can be interpreted as upper bounds on hours worked, and γ_c as minimum consumption.

This functional form is used because of its straightforward interpretation and relative ease of adding heterogeneity of preferences. While the Stone-Geary utility function has been used in previous labor supply studies (Johnson and Pencavel (1984), Rosen (1978), Abbott and Ashenfelter (1976), Brown and Deaton (1972)), most of the literature regarding the effect of taxes and transfers on labor supply is based on a linear hours equation and its associated direct and indirect utility functions. When modeling continuous hours of work, the linear specification is attractive as it results in closed form solutions for both the direct and indirect utility functions, which are necessary for comparing utility between segments and kinks on the budget constraint. However, the discrete choice model used here relies solely on the direct utility function and does not make use of either the indirect utility function or the hours equation. The main disadvantage with this functional form is that the leisure time of the husband and the wife are assumed to be net (income compensated) substitutes. While there is empirical evidence in support of this assumption, there are also several studies that conclude the opposite.[11]

3.2. *Specification of Family Budget Constraint*

The family budget constraint used in this analysis incorporates earnings of the husband and wife, welfare benefits, federal taxes, and nonlabor income. The family budget constraint is:

$$(3.3)\qquad C = w_h h_h + w_w h_w + N + B_A(N, E_h + E_w)\delta_p - T(N, E_h, E_w), \quad \text{where}$$
$$B_A(N, E_h + E_w) = G_A - N - t_A(w_h h_h + w_w h_w) \quad \text{if } B_A > 0 \text{ and } h_p < 100,$$

where N is unearned income, w_h is the husband's hourly wage, w_w is the wife's hourly wage, E_h is the husband's total earnings, and E_w is the wife's total earnings. All hours and income variables are measured by month. The AFDC-UP benefit formula is represented by $B_A(N, E_h + E_w)$ and is equal to the maximum monthly guarantee, G_A, less unearned income and countable earnings ($t_A E$). For every dollar in increased earnings, benefits are reduced by t_A, the implicit

[11] For a survey see McElroy (1981) and Killingsworth (1983). Ransom (1987) and Hausman and Ruud (1984) find the leisure time of the husband and wife to be net substitutes.

tax rate (or benefit reduction rate), and an increase in unearned income decreases benefits one to one. AFDC-UP benefits are added to the family budget constraint if the family has sufficiently low income to qualify for benefits ($B_A(N, E) > 0$), hours of work of the principal wage earner meets the work restriction of 100 hours per month ($h_p < 100$), and the family chooses to participate in AFDC-UP ($\delta_p = 1$).[12]

If the family chooses to participate in the AFDC-UP program, food stamp benefits are considered part of the available benefits and are automatically assigned to the family. All AFDC participants (including AFDC-UP recipients) are categorically eligible for food stamp benefits and participation in the food stamp program by UP recipients is estimated to be over 95 percent (U.S. House of Representatives (1990)). Non-AFDC-UP participants are not assigned food stamp benefits.[13] In the food stamp program, benefits are set federally and vary by family size and benefits are reduced with earnings adding to the already high implicit tax rate on earnings in the AFDC-UP program.[14] The budget constraint in (3.3) also incorporates features of the federal tax system via the nonlinear tax function $T(N, E_h, E_w)$, which depends on unearned income, and earnings of the husband and wife.

The family chooses h_h, h_w, C, and δ_p by maximizing family utility (3.1), subject to the budget constraint in (3.3). Given the complexity of the two-earner problem in the presence of the nonlinear budget constraint, continuous hours of work are not modeled. Instead, the husband and wife are assumed to choose among no work, part-time work, and full-time work.[15] There is evidence supporting a discrete choice approach to the family labor supply problem. In particular, as will be explored in Section 5, monthly hours of work for the husband and wife are concentrated at a few hours points. Further, most AFDC-UP recipients are not working, and the interesting question may not be what policy action will move an individual from 0 to 2.5 hours of work per month, but what action will encourage him or her to work a significant number of hours per month.

[12] There is only one principal earner per family and it can be either the husband or the wife. See Section 2.1 for definition of principal earner.

[13] Because of higher food stamp income requirements, it is possible that a household could be eligible for food stamps but not be eligible for AFDC-UP benefits. However, very few two-parent families living in UP states receive food stamps and not AFDC-UP. Separating food stamps from AFDC-UP would require adding food stamp participation as another choice variable in the model.

[14] AFDC-UP benefits are counted as income in calculating food stamp benefits and increases in AFDC income reduce food stamp benefits at a 30 percent rate.

[15] Nonlinearities in the budget constraint, even in the single-earner case, can make the continuous hours problem intractable. Modeling continuous hours of work requires comparing indirect utility on *each* segment of the budget constraint with utility at zero hours of work. This can require evaluating up to a dozen segments and makes use of the direct utility function, the indirect utility function, and the hours equation. It is extremely difficult to employ a consistent stochastic specification when all three forms of the preferences are required. In the single earner literature, individual authors make a variety of simplifications. Fraker and Moffitt (1988) consider a discrete hours choice and use a reduced form approach to the welfare participation decision. Moffitt and Wolfe (1992) model both discrete hours of work and welfare participation in a reduced form. These problems are magnified with an additional potential wage earner.

The husband and the wife each choose from no work, part-time, and full-time work, leading to a total of nine possible work states or 18 work-welfare possibilities. Some welfare states may be infeasible if family income resulting from a particular hours choice is sufficiently high to render them ineligible for welfare. Whereas solving the family's optimization problem in the continuous hours case requires evaluating maximum utility at each segment of the budget constraint, implementing the discrete labor supply model instead requires evaluating the budget constraint (3.3) at each combination of the husband's hours (h_h), the wife's hours (h_w), and welfare participation (δ_p), and choosing the state that yields the highest utility.

4. EMPIRICAL SPECIFICATION

To empirically implement the discrete state model one must specify the source and form of heterogeneity of preferences and stochastic disturbances. Once these elements are specified, the probabilities for the eighteen states in the discrete model of family labor supply and welfare participation can be derived.

The model provides for heterogeneity in distaste for work (for the husband and the wife) and heterogeneity among households in distaste for welfare. Heterogeneity in distaste for work is introduced through the β parameters in the Stone-Geary utility function given in (3.2) where it is assumed that:

$$\begin{aligned} \beta_h &= \frac{\exp(X'\alpha_h + \theta_h)}{1 + \exp(X'\alpha_h + \theta_h) + \exp(X'\alpha_w + \theta_w)}, \\ \beta_w &= \frac{\exp(X'\alpha_w + \theta_w)}{1 + \exp(X'\alpha_h + \theta_h) + \exp(X'\alpha_w + \theta_w)}, \quad \text{and} \\ \beta_c &= \frac{1}{1 + \exp(X'\alpha_h + \theta_h) + \exp(X'\alpha_w + \theta_w)}, \end{aligned} \tag{4.1}$$

where the elements of the vector X are observed covariates and the θ's represent variables affecting work preferences not observed by the researcher. The X vector contains family variables that are presumed to affect labor supply decisions such as age and education of the husband and the wife, and number and ages of children. The logistic form for the β's is a convenient method to impose both the inequality restrictions ($0 < \beta < 1$) and the summing up condition ($\sum \beta = 1$). In addition, this formulation allows the impact of a given element of X to vary depending on the absolute and relative magnitudes of the β's.

It is assumed that there are M different $(\theta_{hk}, \theta_{wk})$ pairs that determine the husband's and wife's preferences, each observed with probability π_k. That is, the distribution for unobserved heterogeneity in preferences for work takes a discrete form with

$$\Pr(\theta_h = \theta_{hk}, \theta_w = \theta_{wk}) = \pi_k, \quad \text{where } \sum_{k=1}^{M} \pi_k = 1. \tag{4.2}$$

This discrete factor representation of the unobserved heterogeneity is in the spirit of Heckman and Singer (1984).[16] Both the points of support for the joint discrete distribution $\{(\theta_{hk}, \theta_{wk}), k = 1, \dots M\}$ and the associated probabilities $\{\pi_k$ $k = 1, \dots M\}$ are estimated as parameters in the model. This specification for the errors allows for arbitrary correlation between the husband's and wife's labor supply error where independence of the errors can be tested. All else equal, higher values in the unobserved heterogeneity elements (θ) generally imply greater valuation of leisure time (β) and, accordingly, lower work effort. Assessing the impact of the covariates in X on work effort is less straightforward as they depend on the parameter vectors α_h and α_w and the relative magnitudes of β_h and β_w.

Heterogeneity in preferences for welfare participation is assumed to take a continuous form:

$$\phi = Z'\alpha_s + \mu_k + \nu \tag{4.3}$$

where $\nu \sim N(0, \sigma_s^2)$. The elements of the vector Z are observed covariates and the μ_k and ν represent unobservables that affect the welfare participation decision. The Z vector contains variables such as age and education of the household head, and number of children. The μ_k are linked to the M work heterogeneity points and are assumed to be observed with the same probability π_k. This specification builds in arbitrary dependence between the unobservable preferences for welfare and work by allowing the means of the stigma distribution to vary across the labor supply error states (while holding the variance constant across states). The empirical correlation between the μ_k and the θ_{hk} and θ_{wk} can be used to measure the dependence between tastes for work for the husband and wife and tastes for welfare. These can be used to test the hypothesis that people with high tastes for work are more likely to have low tastes for welfare participation. In sum, the model admits three sources of self-selection into welfare including that which results from differences in observable characteristics, correlation between work and welfare participation errors, and high potential benefits that accompany low work effort.

There are two approaches for implementing a discrete state labor supply model when the survey data on hours worked is continuous. The first is to use a rule to convert continuous hours into the discrete categories. For example, one could assign workers reporting less than 120 hours per month to part-time status and workers with more than 120 hours per month to full-time. This mapping is somewhat inconsistent with a model where you have to evaluate utility at specific hours worked (e.g. in this application 0, 80, and 160 hours per month) in

[16] More precisely, a bivariate extension of Heckman and Singer would generate different numbers of points of support for the husband and wife, each with a different set of probabilities. This could be specified as M_h points for the husband with probabilities π_{hk} and M_w points for the wife with probabilities π_{wk}. This would result in $M_h * M_w$ *pairs* of support points. The parameterization taken in this study, with M different combinations of their preferences (or couple "types") for the couple nests this specification.

order to determine maximum utility. In addition, the model may be sensitive to the rule used to assign the discrete states. Empirical distributions of hours worked show that this could be particularly important for wives, a group whose distribution of hours worked is quite uniform over non-full time ranges. An alternative approach (MaCurdy et al. (1990)) is to use the continuous data on hours worked and account for the difference between optimal hours and reported hours as measurement error. This is the approach used here.[17] Let H_h and H_w be observed hours of work for the husband and wife and let h_h and h_w be the discrete level of hours in the family optimization model. Observed and actual hours are assumed to be related through multiplicative measurement error,

$$(4.4)\qquad \begin{aligned} H_h &= e^{\varepsilon_h} h_h \quad \text{and} \\ H_w &= e^{\varepsilon_w} h_w , \end{aligned}$$

where $\varepsilon_i \sim N(-(\sigma_i^2/2), \sigma_i^2)$. This form for measurement error implies that labor force participation is observed with certainty (e.g. $h_h = 0 \Leftrightarrow H_h = 0$), but when predicted hours are positive, they differ from observed hours by a factor of proportionality.[18]

Each family's contribution to the likelihood function is the probability that their observed choice of hours and welfare participation is chosen given their wages, family characteristics, and parameters of the tax and transfer programs. For a family to choose to participate in welfare with hours choices (h_{hi}, h_{wj}) the hours choice must yield the highest utility among all welfare choices *and* the disutility of participating in welfare (ϕ in (3.1)) must be sufficiently low to ensure that the maximum utility on welfare is higher than all nonwelfare choices. Similarly, choosing nonparticipation with hours (h_{hi}, h_{wj}) requires that the hours choice must yield the highest utility among all nonwelfare choices *and* the disutility of welfare must be sufficiently high to ensure that the maximum utility off welfare exceeds that of all welfare choices. This formulation of weighing the "costs" of participating in welfare with the "gains" will be important in the policy simulations in Section 7. The likelihood that a given household has made their observed choice is then formed by deriving this probability for each value of the unobserved heterogeneity and then summing over all values for the unobserved heterogeneity. Appendix A contains a derivation of the likelihood function.

[17] This is not necessarily measurement error in the sense of reporting error on the part of the survey respondents, but instead reflects the difference between the approximation in the discrete model and the continuous data. The main advantage of this approach is that those that lie between no work and part-time or part-time and full-time work (a likely case for married women) do not have to be categorized to one of the discrete hours categories. In the empirical work, the sensitivity to the discrete choice of hours is examined by increasing the number of hours choices.

[18] The form for the mean of the normal distribution generating the error in (4.4) ensures that the expected value of e^{ε} is one. This is analogous to assuming that $E\varepsilon = 0$ in the more familiar additive measurement error model.

The empirical specification incorporates three sources of stochastic disturbances: heterogeneity in distaste for work by the husband and the wife, and heterogeneity in distaste for welfare. Feasibility of maximum likelihood estimation techniques is achieved by assuming a discrete factor representation for the unobserved heterogeneity in distaste for work and assuming discrete choices for the labor supply decisions. If all three forms of heterogeneity were modeled as continuous distributions, then evaluating the resulting trivariate integral would necessitate solving for the limits of integration for each of the probabilities with respect to the three stochastic disturbances. It is solving for the limits of integration that makes this approach intractable here, *not* the evaluation of a trivariate integral per se. Mroz and Guilkey (1992) show that in bivariate mixed continuous-discrete models with endogenous explanatory variables, the discrete factor representation of the errors performs well compared to the maximum likelihood estimates assuming joint normality. They find that "... almost none of the evidence suggests that one should prefer maximum likelihood procedures based upon normal distribution assumptions over the discrete factor approximations, unless one has strong prior evidence that normality is an adequate approximation to the real data under examination" (p. 35).[19]

5. DATA

The data is drawn from the 1984 Panel of the Survey of Income and Program Participation (SIPP). The 1984 SIPP Panel consists of a nationally representative stratified random sample of approximately 20,000 families. These families were originally interviewed between October 1983 and January 1984, and were subsequently interviewed every four months through mid-1986. The SIPP provides monthly data on labor force participation, earnings, sources and amount of unearned income, participation in cash and in-kind transfer programs, household composition, and demographics for each member of the household. In addition, the survey includes detailed work histories for each individual and information on family asset holdings, both of which are necessary to assign AFDC-UP eligibility status to households not currently participating in the program.

The estimation sample includes families satisfying the following selection criteria: (i) family contains a married couple (with both spouses present) with at least one child less than 18 in the household, (ii) family has countable assets less than $1000, (iii) family resides in one of the twenty-six states offering AFDC-UP

[19] Implementing a continuous distribution for unobserved heterogeneity in distastes for welfare participation, on the other hand, is feasible because it operates as a "regime" shift variable. As discussed above, the probability of participation in welfare is the probability that the disutility of welfare participation does not exceed the difference between the maximum attainable utility on welfare and maximum utility off welfare. Early specifications of the model used a discrete formulation and the results showed that a large number of discrete points could be identified. Efficiency decreased due to the additional parameters but the implications of the model did not differ markedly from that presented here.

as of the survey period, and (iv) family contains at least one parent that satisfies the AFDC-UP work history requirement. This selection rule is designed to create a sample of families that satisfy all requirements for AFDC-UP except those based on current hours of work decisions. We do not condition on current hours of work or current income because they are endogenous.[20]

Data from two interview months in the SIPP are combined with asset data and work history data to create the eligible and recipient populations for the analysis. Combining data from two interview months implies that some families appear twice in the dataset. About three-quarters of the sample is composed of families with two observations. The standard errors of the parameter estimates have been adjusted to account for the potential correlation over time for a given family. Table II presents the means of the variables used in the analysis by welfare participation status. All income, benefit, and hours data are measured in monthly levels and all family characteristics are as of the interview month. Of the 1010 total observations, approximately nine percent of the sample is receiving AFDC-UP benefits. Given the modest size of the UP program, this participation rate may seem high. The sample of nonrecipients, however, includes only those two parent families who also pass the asset and work history tests. Dropping the work history requirement does not increase the sample size significantly but increases in the asset limit do increase the size of the nonrecipient sample, thus reducing the participation rate.

Table II shows the rather dramatic differences between recipient and nonrecipient families: Parents in families receiving AFDC-UP benefits tend to have significantly lower education levels, are older, more likely to be minorities, and have larger families than parents in nonrecipient families. In addition, labor force participation for both husbands and wives is much lower among welfare recipients. Table III presents the joint distribution of labor force participation status for the husband and wife by AFDC-UP participation status. In over 85 percent of welfare recipient families, neither the husband nor the wife works. In contrast, both parents are working in almost half of the nonrecipient families. Average hours of work for male welfare recipients are a mere 8 hours per month compared to 161 hours among nonrecipient males. However, this should not be interpreted as the disincentive effect of AFDC-UP because families are likely to be self-selected in the welfare recipient group.[21]

[20] Families with sufficiently high nonlabor income rendering them ineligible to receive AFDC-UP benefits independent of their chosen hours of work (e.g. $N > G$) are also dropped from the sample. In addition, families where either parent is a full-time student, over age 65, disabled, self-employed, families with less than $100 in total monthly income, and individuals with inconsistent employment data are also excluded from the analysis. Sensitivity to the selection criteria is examined in Section 6.

[21] Comparing the characteristics of the SIPP recipient families to the caseload data in Table I shows that the SIPP data are fairly representative of the AFDC-UP population. The only significant difference is that the SIPP data reports more nonwhites participating in the program than the caseload data. The caseload data are based on recipient records and providing information other than that necessary to determine eligibility (such as race) is optional.

TABLE II

MEANS AND STANDARD DEVIATIONS OF VARIABLES USED IN ESTIMATION, BY AFDC-UP PARTICIPATION STATUS

	Participants		Non-Participants	
Variables:	Mean	Standard Deviation	Mean	Standard Deviation
Percent of Observations	8.91%		91.09%	
Husband				
Labor Force Participation	0.078	(.269)	0.943	(.231)
Monthly Hours Worked	8.48	(33.67)	160.61	(53.88)
Years of Education	9.31	(4.77)	12.15	(2.99)
Age	36.62	(10.28)	35.13	(8.48)
Average Hourly Wage—Gross	$9.45	(2.11)	$10.30	(2.07)
Average Hourly Wage—Net	$3.16	(1.06)	$7.34	(1.19)
Wife				
Labor Force Participation	0.056	(0.230)	0.522	(0.500)
Monthly Hours Worked	6.89	(30.75)	69.89	(73.62)
Years of Education	7.86	(4.70)	11.86	(2.70)
Age	33.43	(9.52)	32.88	(8.02)
Average Hourly Wage—Gross	$7.19	(1.24)	$7.46	(1.35)
Average Hourly Wage—Net	$2.41	(0.70)	$5.32	(0.84)
Number of Children	2.74	(1.65)	2.02	(1.05)
Children Less than 6 (1 = yes)	0.633	(0.485)	0.579	(0.494)
Nonwhite (1 = yes)	0.467	(0.502)	0.153	(0.360)
Principal Earner (1 = husband)	0.856	(0.354)	0.82	(0.335)
Monthly Non-Labor Income	$29.44	(96.07)	$53.77	(120.14)
Maximum Monthly AFDC-UP Benefit (G_A)	$628.19	(207.66)	$509.81	(148.49)
Maximum Monthly Food Stamp Benefit (G_F)	$314.23	(92.31)	$273.47	(58.88)
Effective Tax Rate (t_A)	0.483	(0.042)	0.488	(0.062)

Notes: Total number of observations = 1010. Income and benefit levels are monthly. All dollar amounts are in 1986 dollars.

TABLE III

WORK STATUS OF HUSBAND AND WIFE BY AFDC-UP PARTICIPATION STATUS

	Participants	Nonparticipants	All
Husband Not Working			
Wife Not Working	86.67%	1.20%	8.81%
Wife Working	5.56	4.46	4.55
Husband Working			
Wife Not Working	7.78%	46.63%	43.17%
Wife Working	0.00	47.72	43.47

Note: Total number of observations = 1010.

Each of the parents is assumed to choose between no work, part-time, and full-time work. The specific hours points used for both the husband and wife are 0, 80, and 160 hours per month. The data on monthly hours of work from the SIPP, as shown in Figure 1, suggest that the hours of work choices are concentrated at a few points. Thirteen percent of all men and just over half of all women are not working. Further, among welfare recipients, neither the husband nor the wife is working in over 85 percent of the families. The choice of 160 hours per month as the full-time work level is a natural choice given the spike in the empirical hours distribution: Over 60 percent of working men and 47 percent of working women report working exactly 160 hours per month.

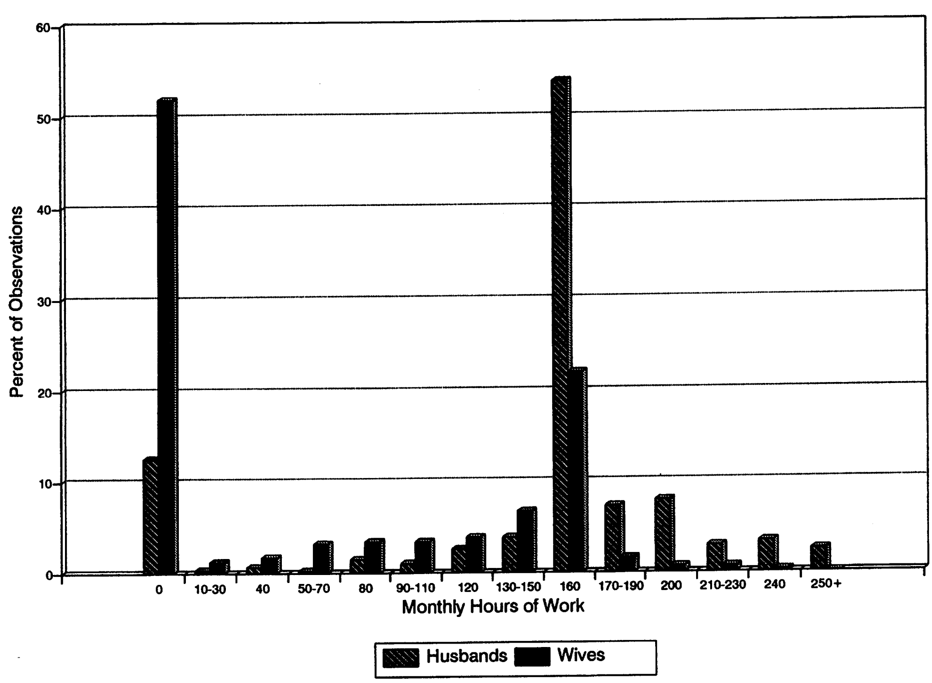

FIGURE 1—Empirical distribution of hours worked by husbands and wives.

To account for missing wages for nonworkers, log wage equations for the husband and wife are estimated accounting for potential sample selection bias.[22] Summary statistics for the wage regression dataset are provided in Appendix Table B.I. Estimates for the wage equations are presented in Appendix Tables B.II and B.III. Variables used to predict wages include characteristics of the individual (age, education, race), characteristics of the family (family size, presence of child less than 6), local labor market variables (unemployment rate and average hourly wage for the SMSA), and geographic identifiers (metropolitan status). Because of skewness in the implied (log normal) distribution for wages, median as opposed to mean wages were predicted. To maintain a consistent stochastic specification, the wage equation estimates are used to predict wages for both workers and nonworkers.[23] Predicted hourly wages average $10.23 for men and $7.44 for women with AFDC-UP participants having lower average predicted wages than nonparticipants.

The last section of Table II provides means of the AFDC-UP program parameters. Maximum benefits by state and family size (G_A) were obtained from program data and averaged about $520 per month (among recipients and nonrecipients). Average effective tax rates under the AFDC-UP program are just under 50 percent. The effective tax rates that households face differ from the statutory rate of 67% and 100% due to earnings exclusions and deductions for child care and work expenses.[24] Food stamp benefits are set federally and vary by family size. In 1984, maximum food stamp benefits for a family of four were about $250. The family budget constraint also incorporates the FICA payroll tax, federal income taxes, and the Earned Income Tax Credit (EITC).[25]

Table II presents average net wage rates for the husband and wife, incorporating the parameters of the tax and transfer system based on the parents' observed hours of work. The high implicit tax rate on earned income while on welfare (combined tax rates of UP and food stamps) causes the net wages of recipients to be almost 60 percent lower than nonrecipients.

[22] This reduced form method for imputing wages for nonworkers is distinct from the model of labor force participation. While it would be desirable to estimate wages for the husband and wife as part of the structural model, it is beyond the scope of this project.

[23] Using predicted wages implies that the budget constraint is not observed perfectly. If wages were predicted only for nonworkers, it would minimize the number of observations with estimation error in the budget constraint. However, this asymmetric treatment of workers and nonworkers could induce spurious differences in the distribution of wages across the two groups.

[24] Fraker et al. (1985) estimated average effective tax rates by state of residence using a 1982 AFDC quality control database (program data) that identified exact deductions and applicable statutory tax rates for a random sample of recipients. Unpublished estimates were provided by the authors for this analysis.

[25] Federal income taxes were calculated assuming couples filed jointly and took the standard deduction. Marginal tax rates varied from 11 to 50 percent. The EITC provides a refundable tax credit to low-income taxpayers with children. In 1984, the maximum credit was $500 with the amount of the credit equal to 10 percent of earned income.

6. ESTIMATION RESULTS

This section provides estimates for the family labor supply and welfare participation model. The main results, presented in Section 6.1, are followed by various sensitivity tests. All results are obtained using maximum likelihood techniques and standard errors are calculated using the matrix of outer partials accounting for possible correlation over time for a given family. The distribution representing unobserved heterogeneity in preferences for work by the husband and wife is estimated with six points of support.[26,27]

6.1. *Primary Results*

Table IV contains the estimates for three main specifications of the model. In the first specification, all families are assumed to have the same distribution of distaste for welfare which is independent of the taste for work (e.g. $\phi_i \sim N(\mu, \sigma_s^2)$). The second relaxes the assumption of independence of the labor supply and welfare participation errors (e.g. $\phi_i \sim N(\mu_k, \sigma_s^2)$ with probability π_k) and the third includes covariates in the distribution of disutility of welfare participation (e.g. $\phi_i \sim N(Z_i'\alpha_s + \mu_k, \sigma_s^2)$). The results from Model 2 show that relaxing the independence assumption improves the overall fit of the model as we can reject the null hypothesis that the means are equal across the six heterogeneity points at about the five percent level. Adding family characteristics to the disutility component adds some explanatory power to the model. None of the variables are individually significant, but they are jointly significant at the ten percent level. The remainder of the results in this section will be based on the estimates in Model 3.

The estimates in Table IV show that while many of the covariates in the heterogeneity in distaste for work (α_h and α_w) are insignificant, they are jointly significant. Most that are individually significant enter in β_w, the marginal propensity to consume leisure (for the wife) out of nonlabor income. A positive coefficient implies that an increase in this covariate increases β, and consequently, reduces work effort. The estimates show that, holding wages constant, the husband's work effort increases with his own education and the number and ages of children, and decreases with his age and the years of schooling of his wife. The wife's work effort is positively related to her own age and education,

[26] Increasing the points of support from four to six significantly improves the overall fit of the model especially in capturing the importance of part-time work for women. The likelihood ratio statistic for the joint significance of the six additional parameters (two points for the husband and wife, and two probabilities) is 127.0, far exceeding the critical value for rejection of the model with four points of support. Adding additional points did not result in an improvement of the likelihood function.

[27] As noted in footnote 16, the model should not be interpreted as capturing *six* heterogeneity points for both the husband and wife. Instead it represents six values for their *joint* tastes for work. Testing was done to determine if the model could be simplified to the case of 2 points for the husband and wife, or 3 points for the husband (or wife) and 2 points for the wife (or husband). In each case, the simplified model was rejected in favor of the more general model.

TABLE IV

RESULTS FROM ESTIMATING MODEL OF WELFARE PARTICIPATION AND FAMILY LABOR SUPPLY[a]

	Model 1		Model 2		Model 3	
α_h:						
Educ. Husband[b]	−0.417	(0.559)	−0.470	(0.691)	−0.483	(0.822)
Educ. of Wife[b]	0.397	(0.549)	0.367	(0.685)	0.385	(0.896)
Age of Husband[b]	0.109	(0.267)	0.159	(0.287)	0.173	(0.291)
Age of Wife[b]	−0.129	(0.220)	−0.143	(0.289)	−0.135	(0.248)
Number of Kids[b]	−0.142	(0.189)	−0.120	(0.173)	−0.113	(0.080)
Any Kids < 6	−0.354	(0.479)	−0.316	(0.466)	−0.313	(0.288)
Nonwhite	0.087	(0.815)	0.128	(0.666)	0.128	(0.875)
α_w:						
Educ. of Husband[b]	−0.027	(0.486)	0.044	(0.033)	0.019	(0.023)
Educ. of Wife[b]	−1.144	(0.168)	−1.164	(0.102)	−1.169	(0.092)
Age of Husband[b]	0.034	(0.020)	0.141	(0.033)	0.143	(0.039)
Age of Wife[b]	0.013	(0.008)	−0.060	(0.025)	−0.066	(0.023)
Number of Kids[b]	−0.064	(0.009)	0.023	(0.006)	0.026	(0.008)
Any Kids < 6	0.457	(0.025)	0.467	(0.026)	0.465	(0.026)
Nonwhite	−0.536	(0.125)	−0.561	(0.147)	−0.544	(0.145)
Heterogeneity, Husband:						
θ_{h1}	−2.451	(0.197)	−2.453	(0.182)	−2.458	(0.173)
θ_{h2}	−2.224	(0.191)	−2.242	(0.160)	−2.247	(0.155)
θ_{h3}	1.496	(0.703)	1.520	(0.987)	1.517	(0.995)
θ_{h4}	1.605	(0.112)	1.562	(0.120)	1.558	(0.107)
θ_{h5}	−1.257	(0.921)	−1.244	(0.927)	−1.248	(0.887)
θ_{h6}	−1.682	(0.273)	−1.633	(0.232)	−1.607	(0.207)
Heterogeneity, Wife:						
θ_{w1}	−2.500	(0.071)	−2.538	(0.065)	−2.530	(0.066)
θ_{w2}	2.008	(4.695)	2.000	(8.269)	1.990	(2.773)
θ_{w3}	−1.433	(0.127)	−1.412	(0.128)	−1.421	(0.132)
θ_{w4}	1.088	(0.777)	1.092	(0.648)	1.076	(0.591)
θ_{w5}	1.862	(4.433)	1.865	(4.940)	1.868	(5.957)
θ_{w6}	−1.169	(0.123)	−1.187	(0.138)	−1.186	(0.141)
Heterogeneity Probabilities:						
π_1	0.320	(0.026)	0.327	(0.026)	0.325	(0.027)
π_2	0.373	(0.074)	0.369	(0.080)	0.370	(0.079)
π_3	0.056	(0.009)	0.056	(0.009)	0.056	(0.009)
π_4	0.088	(0.013)	0.085	(0.015)	0.086	(0.015)
π_5	0.032	(0.076)	0.033	(0.078)	0.033	(0.079)
Threshold Parameters:						
γ_h	301.725	(23.914)	302.083	(19.357)	300.759	(22.935)
γ_w	244.615	(22.635)	246.343	(20.334)	247.790	(22.568)
γ_c	−124.738	(17.199)	−131.772	(21.029)	−132.057	(22.449)
Measurement Error:						
σ_h	0.234	(0.002)	0.236	(0.002)	0.235	(0.002)
σ_w	0.377	(0.012)	0.385	(0.012)	0.385	(0.012)

TABLE IV—*Continued*

	Model 1		Model 2		Model 3	
Welfare Participation:						
Constant	0.0756	(0.0276)	—	—	—	—
Education[c]	—	—	—	—	0.012	(0.025)
Age[c]	—	—	—	—	0.002	(0.009)
Number of Kids[b]	—	—	—	—	0.001	(0.008)
Nonwhite	—	—	—	—	−0.020	(0.021)
μ_1	—	—	0.131	(0.042)	0.135	(0.041)
μ_2	—	—	0.065	(0.058)	0.071	(0.038)
μ_3	—	—	0.058	(0.027)	0.064	(0.027)
μ_4	—	—	0.077	(0.026)	0.086	(0.021)
μ_5	—	—	0.093	(1.491)	0.121	(1.474)
μ_6	—	—	0.124	(0.071)	0.128	(0.061)
σ_s	0.0430	(0.0171)	0.037	(0.020)	0.037	(0.018)
Log of Likelihood Function	−8237.156		−8231.915		−8227.577	
Number of Observations	1010		1010		1010	

[a]Author's calculations based on 1984 SIPP. Standard errors are given in parentheses and were calculated using the matrix of outer partials of the likelihood function.
[b]Education, age, and number of children variables are normalized as follows:
(education-12)/10,
(age-35)/10, and
(# of children-2).
[c]Education and age of the principal earner.

and negatively related to the number and ages of children, and to her husband's age. Further, husbands in nonwhite families have lower work effort than their white counterparts, while wives in nonwhite families have higher work effort. These results match the empirical labor supply literature (Pencavel (1986), Killingsworth and Heckman (1986), Ransom (1987)). The most important characteristics, both in magnitude and statistical significance, are the effects of wife's education, number and ages of children, and race on the work effort of the wife.

The estimates of the model imply large variability in distaste for work among the population of two-parent households potentially eligible for AFDC-UP benefits. Average values for β_h, β_w, and β_c evaluated at population means for the covariates are 0.12, 0.46, and 0.42 respectively. Recall that these preference parameters correspond to the marginal propensity to consume nonmarket time (leisure) or consumption goods out of nonlabor income. The estimates imply that if nonlabor income (e.g. welfare benefits) increases by a dollar, on average, households will increase consumption by 42 cents and reduce husband's earnings by 12 cents (through a reduction in labor supply) and reduce the wife's earnings by 46 cents. These estimates imply that the leisure time of the wife is valued more heavily at the margin than the husband's leisure time.[28]

[28]For the interested reader, Hoynes (1992) provides a more detailed discussion of the estimated distribution of unobserved heterogeneity and the effect of family characteristics on work effort.

The specification for the unobserved elements of preferences for work allows for unrestricted correlation between the unobservable elements for the husband (θ_h) and wife (θ_w). The empirical correlation coefficient for the husband and wife is 0.11, implying that, holding constant all observable variables, higher work effort for the husband is correlated with higher work effort for the wife.[29] This result was also found by Hausman and Ruud (1984) and Ransom (1987).

Model 3 shows that holding constant wages and benefits, the estimated disutility of welfare receipt is higher (and thus welfare participation is lower) for parents with higher education levels, white families, families with older parents, and larger families. These results are qualitatively similar to those found by Moffitt (1983) for female-heads of household. The estimates imply a strong negative correlation between the unobservable elements of work effort and welfare participation. Further, this correlation is much higher for the wife's work effort than for the husband's work effort: the empirical correlation coefficient between the mean of the welfare participation error μ and work effort for husbands (θ_h) is -0.31 and between μ and θ_w is -0.84. This negative correlation between welfare participation and labor supply errors implies further evidence of self-selection into welfare. Even in the absence of AFDC-UP, previous welfare participants will work less than nonparticipants.

6.2. *Model Extensions and Sensitivity Tests*

This section examines the robustness of the results to three changes in the model assumptions. We consider expanding the choice set for hours worked, modifying the eligibility requirements for AFDC-UP participation, and adding fixed costs of work. We find that the substantive results and model implications are robust to these specification changes.[30]

(a) *Expanding Hours of Work Choice Set*

Increasing the number of hours choices provides insight as to the restrictiveness of the discrete choice formulation of the model. In addition, one of the policy simulations considered in the next section is the elimination of a 100 hour cap on hours worked per month by the principal earner. This simulation may be sensitive to the specification for the choice set in hours worked. Model 4 in Table V gives the parameter estimates with an additional hours choice for the husband and wife of 120 hours per month. The model presents a better fit for wives since many women work less than full-time. The implication of adding an additional part-time hours choice is to increase the sensitivity of welfare

[29] The empirical correlation coefficient is calculated as $\rho_{hw} = [\Sigma_k \pi_k \theta_{hk} \theta_{wk} - \mu^h \mu^w]/\sigma^h \sigma^w$ where μ^h, μ^w, σ^h, and σ^w are the mean and standard deviations of the errors for the husband and wife.

[30] For simplicity, the three specifications are extensions of model 2 in Table IV where covariates in the welfare participation term are excluded. While these variables are marginally jointly significant (in model 3), the implications of the extensions to the model are not sensitive to the exclusion of these covariates.

TABLE V

EXTENSIONS OF MODEL OF WELFARE PARTICIPATION AND FAMILY LABOR SUPPLY[a]

	Model 4		Model 5		Model 6	
α_h:						
Educ. Husband[b]	−0.489	(0.568)	−0.488	(0.539)	−0.490	(0.678)
Educ. of Wife[b]	0.408	(0.673)	0.384	(0.658)	0.401	(0.741)
Age of Husband[b]	0.181	(0.243)	0.176	(0.204)	0.176	(0.344)
Age of Wife[b]	−0.162	(0.235)	−0.154	(0.180)	−0.139	(0.335)
Number of Kids[b]	−0.103	(0.003)	−0.050	(0.001)	−0.097	(0.048)
Any Kids < 6	−0.317	(0.144)	−0.381	(0.045)	−0.298	(0.040)
Nonwhite	0.152	(0.574)	0.212	(0.461)	0.129	(0.685)
α_w:						
Educ. of Husband[b]	−0.018	(0.011)	−0.082	(0.028)	−0.005	(0.007)
Educ. of Wife[b]	−1.142	(0.109)	−1.090	(0.074)	−1.166	(0.059)
Age of Husband[b]	0.123	(0.036)	0.087	(0.015)	0.142	(0.040)
Age of Wife[b]	−0.093	(0.055)	−0.132	(0.021)	−0.075	(0.026)
Number of Kids[b]	−0.003	(0.004)	0.074	(0.005)	0.036	(0.011)
Any Kids < 6	0.421	(0.030)	0.355	(0.018)	0.465	(0.024)
Nonwhite	−0.537	(0.086)	−0.492	(0.076)	−0.540	(0.133)
Heterogeneity, Husband:						
θ_{h1}	−2.437	(0.167)	−2.499	(0.130)	−2.482	(0.197)
θ_{h2}	−2.242	(0.169)	−2.299	(0.117)	−2.181	(0.193)
θ_{h3}	1.439	(0.947)	1.451	(0.654)	1.470	(0.974)
θ_{h4}	1.532	(0.278)	1.536	(0.059)	1.416	(0.117)
θ_{h5}	−1.319	(1.010)	−1.224	(1.116)	−1.204	(0.904)
θ_{h6}	−1.637	(0.317)	−1.607	(0.161)	−1.578	(0.215)
Heterogeneity, Wife:						
θ_{w1}	−2.474	(0.168)	−2.561	(0.061)	−2.415	(0.102)
θ_{w2}	2.118	(4.189)	2.006	(2.493)	2.070	(1.758)
θ_{w3}	−1.359	(0.159)	−1.371	(0.136)	−1.442	(0.128)
θ_{w4}	1.002	(0.412)	1.106	(0.266)	1.043	(0.419)
θ_{w5}	1.854	(2.641)	1.877	(7.162)	1.798	(2.150)
θ_{w6}	−1.131	(0.144)	−1.130	(0.070)	−1.141	(0.124)
Heterogeneity Probabilities:						
π_1	0.317	(0.032)	0.333	(0.020)	0.317	(0.049)
π_2	0.366	(0.100)	0.388	(0.050)	0.371	(0.099)
π_3	0.061	(0.012)	0.048	(0.006)	0.059	(0.009)
π_4	0.083	(0.018)	0.069	(0.012)	0.082	(0.015)
π_5	0.036	(0.099)	0.036	(0.053)	0.035	(0.096)
Threshold Parameters:						
γ_h	300.593	(28.588)	302.354	(12.991)	300.620	(17.313)
γ_w	247.809	(23.481)	254.479	(15.544)	248.125	(19.442)
γ_c	−132.942	(40.739)	−145.502	(18.053)	−133.085	(22.942)
Fixed Costs of Work:						
Husband Works	—	—	—	—	102.154	(33.952)
Wife Works	—	—	—	—	4.353	(22.277)
Both Work	—	—	—	—	114.778	(6.074)
Measurement Error:						
σ_h	0.234	(0.002)	0.223	(0.002)	0.234	(0.002)
σ_w	0.405	(0.012)	0.410	(0.007)	0.379	(0.011)

TABLE V—*Continued*

	Model 4		Model 5		Model 6	
Welfare Participation:						
μ_1	0.131	(0.030)	0.135	(0.023)	0.129	(0.035)
μ_2	0.064	(0.038)	0.072	(0.058)	0.064	(0.043)
μ_3	0.058	(0.026)	0.059	(0.017)	0.054	(0.030)
μ_4	0.084	(0.022)	0.085	(0.014)	0.085	(0.019)
μ_5	0.112	(2.314)	0.118	(2.628)	0.109	(1.254)
μ_6	0.123	(0.076)	0.127	(0.046)	0.125	(0.059)
σ_s	0.037	(0.018)	0.038	(0.011)	0.038	(0.021)
Log of Likelihood Function	−8237.509		−13821.191		−8230.143	
Number of Observations	1010		1653		1010	

[a]Author's calculations of the 1984 SIPP. Standard errors are given in parentheses and were calculated using the matrix of outer partials of the likelihood function.
[b]Education, age, and number of children variables are normalized as follows:
(education-12)/10,
(age-35)/10, and
(# of children-2).

participation to policy changes. However, this does change the main results of the model.[31]

(b) *Modifying Eligibility Restrictions for AFDC-UP*

To explore the importance of eligibility requirements in constructing the estimation dataset, we created an expanded sample where we eliminated the work history requirement and increased the asset requirement from $1000 to $5000. The asset test and work history tests, however, may also be endogenous since families can spend down their assets and/or increase their work effort with the goal of gaining access to the program in the future. Most of the increase in the sample comes from raising the asset requirement as most families contain at least one parent that satisfies the work history requirement. The characteristics of the overall sample change in the expected ways: the expanded sample consists of fewer welfare participants, smaller families, fewer nonwhites, more workers, and parents with higher education levels and higher wages. However, this is mainly a composition effect as the characteristics of nonparticipants do not change substantially.

The parameter estimates, as shown in Model 5 in Table V, reflect the fact that the sample consists of more working families not participating in AFDC-UP.

[31]I considered several specifications of the labor supply choice set to address the more general concern of sensitivity to the number of hours points. Adding additional part-time points provides a better fit of the hours distribution for women, and adding points greater than 160 hours per month improves the fit for husbands. Additional increases to the set of hours choices did not improve the fit of the model. The policy simulations for these models did not differ substantively from those reported in the text.

Specifically, the mean for the stigma is higher and the probabilities for the unobserved tastes for work have shifted more toward high work effort points of support. These estimates imply somewhat larger effects of policy parameters on welfare participation and work effort than in the base model. The larger response is due to the larger pool of potential program entrants. This does not affect the choices that welfare participants make in the absence of the program as there is no change in the estimated work disincentive effects of the program.[32]

(c) *Adding Fixed Costs of Work*

Fixed costs of work have been found to be empirically important determinants of labor supply for married women (Heckman (1974), Cogan (1980), Hanoch (1980), Blau and Robins (1988), Ribar (1992)) and female heads of household (Hausman (1980), Blank (1988)). Costs of work may include transportation costs, child care costs, and other work expenses such as uniforms and tools. If these costs are important determinants of labor supply decisions, then ignoring these costs will overestimate work disincentive effects. Model 6 in Table V adds three parameters representing the fixed costs associated with three family labor force participation choices: husband works (wife does not), wife works (husband does not), and both work. Fixed costs of work are likely to vary across these cases due to differing transportation or other costs for the husband and wife, and differences in child care needs depending on parental availability for home based care.

The estimated costs of work are $102 per month when only the husband is working and $114 when both the husband and wife are working. The fixed costs when only the wife is working is an insignificant $4 per month. The larger costs for the husband relative to the wife may reflect differences in the types of jobs undertaken by men and women. However, it is surprising that the costs when both parents are working is small, and no larger than the costs associated with only the husband working. The costs when both parents work represent only about 5 percent of monthly earnings, significantly lower than Blank (1988) or Cogan (1980). This may reflect the fact that families with two working parents tend to have fewer children, and fewer younger children requiring child care. This extension does change the model implications significantly.

7. POLICY SIMULATIONS

In this section, I estimate the impact of increasing the maximum benefit available under AFDC-UP (G_A), decreasing the implicit tax rate on earnings (t_A), and eliminating the work restriction for the principal earner on labor supply and the probability of welfare participation. I also examine the effects of eliminating the AFDC-UP program on work effort and family income. Table VI presents the average probability of participation in AFDC-UP as well as

[32] We also considered asset limits of $7,500 and $10,000. The effect on the simulations was similar.

TABLE VI

SIMULATION RESULTS: EFFECT OF CHANGES IN MODEL VARIABLES ON WELFARE PARTICIPATION, EMPLOYMENT RATES AND HOURS WORKED[a]

	Current Law Estimates	Policy Simulation: Increase G 20%	Policy Simulation: Decrease t_A 20%	Policy Simulation: Eliminate Work Restriction	Actual
Probability of Welfare Participation	8.43	9.93	8.92	8.78	8.91
Probability of Eligibility for Welfare	10.93	13.0	13.0	15.0	10.79
All Families:					
Employment Rate					
Husband	87.0	86.8	87.0	87.0	86.6
Wife	49.4	48.8	49.5	49.2	48.0
Average Hours					
Husband	137.7	137.0	137.5	138.1	147.1
Wife	70.7	70.0	70.7	70.6	64.3
On Welfare:					
Employment Rate					
Husband	9.9	14.9	12.6	13.6	7.8
Wife	7.6	8.4	11.2	7.3	5.6
Average Hours					
Husband	8.4	12.7	11.2	19.3	8.5
Wife	6.5	7.3	10.0	6.3	6.9
Off Welfare:					
Employment Rate					
Husband	94.1	94.7	94.3	94.1	94.3
Wife	53.2	53.3	53.2	53.2	52.2
Average Hours					
Husband	149.6	150.7	150.0	149.5	160.6
Wife	76.6	76.9	76.6	76.7	69.9
Simulations Based on Reduced Form Model:					
Probability of Welfare Participation	8.87	10.54	7.50	—	8.91

[a] The simulations are preformed by evaluating each of the eighteen work-welfare probabilities for each observation in the sample and taking the mean over all observations. These estimates are based on parameter estimates for Model 3 in Table IV. The last row of the table presents estimates from a reduced form model of welfare participation given in Appendix Table B.IV.

predicted employment rates and average hours worked for the husband and wife by welfare participation status under current law and the various policy simulations. These results are based on Model 3 in Table IV.[33] For comparison, the last column of Table VI contains the actual value, based on the SIPP sample.

As a further robustness check, the bottom of Table VI contains simulations based on a reduced form model of welfare participation. These are based on a probit equation for the decision to participate in the AFDC-UP program as a function of all exogenous variables in the model including demographic variables, wages, and program characteristics.[34] This can be used to examine the effect of changes in the benefit and implicit tax rate, but cannot be used to examine the effect of removing the 100-hour rule or eliminating the program.

Employment and Welfare Participation under Current Law

At current values for all family characteristics and welfare program parameters, predicted welfare participation and labor supply status match the distribution in the population closely. These baseline estimates are displayed in the first column of Table VI. The predicted welfare participation rate is 8.4 percent and about 11 percent of the sample is predicted to be eligible to receive welfare benefits. The implied take-up rate among eligibles is 77 percent, compared to 45 percent for female heads of household (Moffitt (1983)). The higher take-up rate is in part due to imposing the asset requirements which was not done in the studies of female heads of household. Predicted employment rates and average hours worked are presented by welfare participation status. Overall, about 87 percent of the husbands and 49 percent of the wives are predicted to participate in the labor market compared with only 10 percent of the men and 8 percent of the women for those on welfare. Over twenty percent of working women are predicted to work part-time, while few working men choose part-time work. This difference in the dispersion of hours worked is reflected in the distribution of actual hours worked, as displayed in Figure 1.

Increasing AFDC-UP Benefits

Increasing the benefit guarantee for the AFDC-UP program induces a significant increase in welfare participation and, to a lesser degree, a decrease in

[33]The simulations are constructed by using the model estimates to predict the probabilities for each of the work-welfare choices given values of the family variables (wages, nonlabor income, and demographic characteristics) and AFDC-UP program parameters. Average probabilities are created for each work-welfare state by predicting the probabilities for each observation and then taking the mean over all observations. Policy simulations are performed by changing eligibility or benefit rules of the AFDC-UP program and comparing average hours of work and probability of welfare participation to that experienced under current law.

[34]Appendix Table B.IV presents estimates from the reduced form AFDC-UP participation model. Because of the endogeneity of net wages, gross wages are used. The most important determinants of participation in terms of magnitude and significance are education, race, and benefits. All parameter estimates are of the expected sign except the implicit tax rate which is negative. This may be due to a specification error arising from entering the gross wage and implicit tax rate linearly.

average hours of work in the population. The results of increasing the maximum benefit are shown in the second column of Table VI. Increasing the maximum benefit (G_A) by 20 percent increases participation in AFDC-UP by 18 percent. This increase implies an elasticity of the probability of welfare participation with respect to the benefit guarantee of about 0.89. The simulations from the reduced form model match these simulations closely. An increase in benefits of 20 percent increases the probability of participation by 19 percent. Two-parent families are more sensitive to changes in benefits than female-heads of household. Using a sample of female-heads of household, Moffitt (1983) estimated this elasticity to be 0.60.

This increase in participation is due to *mechanical* and *behavioral* effects of the increase in benefits (Ashenfelter (1983)). By increasing benefits, the breakeven point increases and many families become eligible for AFDC-UP *without* changing their hours of work (mechanical effect). For others the increase in benefits may cause a discontinuous reduction in hours of work, thus rendering them eligible for welfare (behavioral effect). About 60 percent of the increase in participation is attributable to families who become eligible through reducing hours of work (we refer to these families as "switchers"). Hours worked among switchers were reduced from 89 to 41 hours per month for men and from 70 to 18 hours per month for women.

Through a pure income effect, increasing the guarantee decreases average hours worked in the entire population. Because welfare recipients comprise a small fraction of the total population, the overall decrease is not large. However, because of composition effects, employment actually *increases* in the welfare population. The labor supply response among existing recipients is small, as over 80 percent of the recipients are not working. Although switchers experience a significant reduction in hours of work in response to an increase in the guarantee, their work effort while on welfare is higher than that among the existing welfare population bringing up the recipient average. Studies that use current recipients to estimate labor supply effects of a change in program parameters overlook entry effects.

Decreasing Implicit Tax Rate on Earnings

Decreasing the AFDC-UP benefit reduction rate affects both welfare participation and family labor supply, but less than changing the maximum benefit level. The third column of Table VI shows the results of decreasing the implicit tax rate on earnings by 20 percent. The participation rate increases about 6 percent. Unlike the pure income effect associated with changing the maximum benefit, the effects on labor supply are dampened because, like increasing wages, there is both an income and substitution effect. Table VI shows that the decrease in the implicit tax rate increases eligibility to the same level as the twenty percent increase in the benefit level, but the associated increase in participation is lower. The decrease in the implied tax rate on earnings implies a smaller average increase in income compared with the simulated increase in the program guarantee. At low levels of work effort, a decrease in the benefit reduction rate generates only small increases in benefits while an increase in the guarantee increases benefits equally across all work levels. Recall from Section 4 that a family will participate in welfare if the disutility of welfare participation does not exceed the difference between maximum utility on welfare and that off welfare. While reducing the benefit reduction rate implies that more families are eligible, their potential gain to receiving welfare is lower, and thus the increase in participation is not as large. The reduced form model predicts the wrong direction for the tax effect. However, the coefficient on implicit taxes is estimated quite imprecisely.

Eliminating the Principal Earner Work Restriction

One of the eligibility requirements that distinguishes AFDC-UP from the rest of the AFDC program is the restriction on hours worked by the principal earner. Currently, the principal earner is restricted to work no more than 100 hours in a given month, but many states as well as several welfare reform proposals have proposed eliminating this requirement (National Governors' Association (1994)). A structural model which recovers the utility function, permits the simulation of the effect of changing a provision that exhibits no variability across families.

Eliminating the work restriction for the principal wage earner has a dramatic effect on the size of the population eligible to receive benefits under AFDC-UP but does not increase participation appreciably. These results, displayed in the fourth column of Table VI, are at first glance surprising, but are consistent with the incentives to participate in the AFDC-UP program. Significantly more families are eligible for AFDC-UP benefits when the work restriction is removed: eligibility increases by a third to 15 percent. However, participation increases marginally to 8.8 percent. An increase in maximum benefits increases attainable income at every hour of work choice. Eliminating the 100 hour rule only affects the income attainable at *full-time* labor supply choices. Any increase in welfare participation must come from households where one parent is working full-time, because the policy change does not affect any non-full time options.

The increase in eligibility reflects the fact that many low wage individuals are eligible for benefits even while working full time. For example, a family with two children where the husband is working full-time (160 hours per month) at the minimum wage ($3.35 in 1985) would have a total of $536 in monthly income. This would make them eligible for AFDC benefits in *nine* states, including the high population states of California and New York. However, for a family to participate in welfare, increases in income must outweigh the implied disutility of being on welfare. Here, the potential gain is small (i.e. families affected by the elimination of the work restriction by definition are working full-time and are only eligible for relatively low levels of benefits) and the disutility of participation, be it transactions costs or stigma, dominates with few families choosing to participate.

This simulation is likely to be sensitive to the restriction to three hours of work choices. That is, the current model generates an increase in participation only from individuals working 160 hours per month, whereas the removal of work limitation affects everyone working more than 100 hours per month. However, using the model that adds 120 hours per month to the choice set for husbands and wives, as in Table VII, does not lead to a substantial increase in the participation effect. The reason is that while many women are working part-time, only a small fraction of working men are working less than full-time. Husbands are the principal earners in over 85 percent of families, and it is primarily the husband's hours of work that affect this policy change. Thus expanding the number of hours choices does not change the simulated hours distribution significantly.[35]

The argument for eliminating the work restriction is to encourage work effort among existing welfare participants with the hope of a reduction in welfare dependency. The results of the model show that there are significant increases in work effort among the principal earners when the hours cap is eliminated. Among current UP participants, about three-quarters of the working men increase their work effort from part-time to full-time in response to the elimination of the 100-hour rule.

Estimated Work Disincentive Effects of the AFDC-UP Program

Eliminating the AFDC-UP program produces a significant increase in hours worked by both parents. These results, displayed in Table VII, imply large work disincentive effects of the AFDC-UP program. Average hours worked under current law are 150 hours for men off welfare, compared with 8 hours per month for men on welfare. For women the difference is 70 hours (77 versus 7). These differences cannot be attributed solely to the work disincentive effects of the program because participants may differ from nonparticipants in observable (as well as unobservable) characteristics. The descriptive statistics in Table II show that welfare participants tend to be older, less educated, have larger families, and, most importantly, have lower wages. Furthermore, the results suggest a negative correlation between tastes for work and tastes for welfare. The work disincentive effects are estimated to be the difference between predicted hours under current law and hours worked in the absence of the program.[36] Eliminating the UP program causes hours worked among participants to increase to 54 for men and 40 hours for women resulting in nontrivial work disincentive effects of the AFDC-UP program of 46 hours per month for men and 33 hours per

[35]About forty percent of the women in the sample do not have sufficient labor force experience to satisfy the requirements for eligibility in the AFDC-UP program (e.g. they could not be the principal earner). If more families were eligible with the woman as the principal earner, then we could have a much greater increase in the caseload from eliminating the 100 hour rule since many more women work between 100 and 160 hours per month.

[36]We assume that all welfare participants also receive food stamp benefits. Simulating the elimination of the AFDC-UP program also includes eliminating food stamp benefits.

TABLE VII

ESTIMATED WORK DISINCENTIVE EFFECTS OF AFDC-UP PROGRAM: EMPLOYMENT RATES AND AVERAGE HOURS OF WORK BY WELFARE PARTICIPATION STATUS[a]

	Percent of Population	Average Hours Worked		Employment Rates		Average Disposable Income	Average Utility
		Husband	Wife	Husband	Wife		
Current Law							
On Welfare	8.43	8.4	6.5	9.9	7.6	$831	5.706
All Eligible	10.93	14.4	18.4	15.6	15.5	817	5.710
Off Welfare	91.57	149.6	76.6	94.1	53.2	1763	6.408
All	100.00	137.7	70.7	87.0	49.4	1684	6.349
Program Eliminated							
On Welfare Under Current Law	8.43	54.4	40.0	58.0	37.2	$748	5.671
Off Welfare Under Current Law	91.57	149.6	76.6	94.1	53.2	1763	6.408
All	100.00	141.5	73.2	91.1	51.9	1677	6.346

[a]The simulations are based on the estimates for Model 3 in Table IV.

month for women. Because participation in the UP program is low, the overall effect of the transfer program on labor supply among all two-parent families is modest. Table VII shows that the work disincentive effect of UP on all two-parent families is 4 hours for husbands and 3 hours for wives.[37]

While this is the first study which presents estimates of the work disincentive effects of the AFDC-UP program, there are two related areas of research on the effects of transfers on labor supply which we can use for comparison. First, the work disincentive effects of the AFDC-UP program are similar to those estimated for female-heads of household receiving AFDC. The surveys of Danziger et al. (1981) and Moffitt (1992) report that AFDC reduces work effort among all female heads of household by between 4 and 40 hours per month. Because of higher overall welfare participation rates among single mothers, the effect of AFDC on the labor supply of all female heads of household (as opposed to the effect on participants) is larger than that found here for two-parent families. Among welfare participants, the results for female heads and married couples are much closer.

A second comparison is to participants in the negative income tax (NIT) experiments. Like AFDC, a negative income tax program is characterized by two parameters: the benefit guarantee and the benefit reduction rate. Robins (1985)

[37]The family labor supply model used in this analysis assumes that individuals are unconstrained in the labor market. That is, given their offer wage, the husband and wife can choose to work part time, full time, or not at all. Labor demand enters the model only in the sense that offer wages vary with local labor market conditions. To the extent that this does not fully capture the demand side of the labor market the work disincentive effects are an upper bound on the actual effect. See Hoynes (1992) for estimates of the work disincentive effects for a rationing model.

summarizes the extensive literature and finds the introduction of an NIT reduces monthly hours of work by about 7 hours for husbands (a reduction of about 5 percent) and 10 hours for wives (a 20 percent reduction). These are somewhat larger than the AFDC-UP estimates of 4 hours for husbands and 3 hours for wives reported here. There are several characteristics of the NIT experiments that may account for this difference. First, the NIT programs implemented in the experiments were significantly more generous than the AFDC program. Breakeven income levels averaged between 160 percent and 120 percent of poverty (Robins (1985)) while even the most generous states fail to provide AFDC benefits to families much above the poverty line (U.S. House of Representatives (1992)). Second, because of the sample selection conditions used in the experiments, the NIT results correspond to the behavioral effects among low-income families, a group more likely to have larger responses to the NIT. Third, in contrast to the AFDC-UP program, take-up rates for the NIT were, by design, 100 percent, and costs of participation (time costs or stigma) were negligible.[38] Other differences between the NIT experiments and AFDC-UP include a disproportionate number of nonwhite families participating in the experiments, the particularities of the local labor market conditions in the NIT sites, and the limited duration of the experiments.

Despite the large estimated work disincentive effects among AFDC-UP families, there is strong evidence of self selection into welfare. Welfare recipients have a significantly lower propensity to work than those off welfare even in the absence of the program. For example, under the current system, husbands in nonwelfare families work, on average, 142 hours per month more than husbands on welfare. If AFDC-UP was eliminated, hours worked among welfare recipients would increase significantly (as reflected in high estimated work disincentive effects) but two-thirds of the hours gap would still remain: Men off welfare would still work, on average, almost 100 hours more per month than those in the welfare population.

Finally, these results imply that if the AFDC-UP program was eliminated, the increase in labor force participation and hours of work is not sufficient to make up for the loss in welfare benefits. Family income (after tax and transfer income) under current law averages $831 for welfare recipients. Despite the increase in work effort, family income among previous recipients falls by 10 percent when the program is eliminated. In fact, in the absence of the program about seventy percent of previous AFDC-UP recipients would still be eligible for benefits. This result is quite striking in the context of the current welfare reform debate. The proponents of a work based reform of welfare argue that moving people from welfare to work will increase incomes and reduce poverty. These results instead suggest that, among two-parent families, income will fall and poverty will increase. The long run effects may differ if labor market participation leads to an increase in human capital and wages.

[38] Each month members of the treatment group were required to report their hours worked. Their benefit was calculated and a check was mailed to all families with income below the breakeven point.

9. CONCLUSIONS

The results imply that labor supply and welfare participation among two-parent households potentially eligible for AFDC-UP are quite sensitive to changes in the eligibility and benefit structure. The policy simulations are robust to changes in the specification of the economic and empirical model. Hours of work among current AFDC-UP participants are significantly below what they would be in the absence of the program. Work disincentive effects for welfare participants range from 42 to 50 hours per month for husbands and 29 to 33 hours per month for wives, depending on the specification of the economic and empirical model. Because of low participation rates in AFDC-UP, the reduction in labor supply in the overall population of two-parent families is only 4 hours per month for husbands and 3 hours for wives. Despite the large estimated work disincentive effects, upon elimination of the AFDC-UP program most families would fail to increase earnings sufficiently to replace the loss in income. As a result, almost seventy percent of previous AFDC-UP recipients would retain eligibility for welfare benefits.

The results imply that increasing program generosity will lead to higher caseloads. However, the magnitude of the caseload effect depends on the policy parameter used. The probability of welfare receipt is more sensitive to changes in the maximum benefit than changes in the implicit tax rate. The elasticity of the probability of AFDC-UP participation with respect to the maximum benefit is 0.9. Further, eliminating the principal earner work restriction, a proposal currently under consideration in many states, will significantly increase the size of population eligible to receive AFDC-UP benefits but will have almost no effect on the number of families participating in the program. The percent increase in participation ranges from 3.4 percent to 6.6 percent compared to an estimated increase in eligibility of about 35 percent.

By looking at program data alone, it is clear that AFDC-UP recipients are quite different from female-headed households receiving AFDC. AFDC-UP families are less likely to be minorities and are more likely to contain older parents. Furthermore, the work history requirement imposed on two-parent families implies that at least one parent has had some prior attachment to the labor market which typically translates into higher offer wages and greater labor market opportunities. These differences translate into the possibility of higher behavioral responses among two-parent families. Both the estimated work disincentive effects and the sensitivity of welfare participation to increases in the maximum benefit level are greater than that found in the existing literature on female-headed households. Given the recent expansion of benefits to cover two-parent households, studies such as this are necessary to gain greater insight into the effects of government transfers on family labor supply among intact families in the low income population.

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APPENDIX A

LIKELIHOOD FUNCTION FOR MODEL OF LABOR SUPPLY AND WELFARE PARTICIPATION

The discrete model has eighteen work-welfare states (three labor supply choices for the husband, three labor supply choices for the wife, and the welfare participation choice). The economic model implies that the family chooses the state yielding the highest utility. This requires evaluating the budget constraint in (3.3) at each combination of hours of work and welfare choice and using the AFDC-UP benefit formula to evaluate potential welfare benefits at each of the feasible hours points. Define the following indicator variables for the discrete states:

(A.1) $$\delta_{ijl} = \begin{cases} 1 & \text{if } h_h = h_{hi},\ h_w = h_{wj}, \text{ and } \delta_P = l, \\ 0 & \text{otherwise,} \end{cases}$$

for $i = 0,1,2$, $j = 0,1,2$, and $l = 0,1$.

The variable δ_{001} represents the state where neither the husband nor the wife is working and the family receives welfare benefits. The set of discrete hours points are represented by $\{h_{hi}\}$ for the husband and $\{h_{wj}\}$ for the wife. Let $C(h_{hi}, h_{wj}, l)$ be family consumption that results from evaluating the budget constraint (3.3) at the work-welfare state defined by $\delta_{ijl} = 1$. Substituting this into the family utility function in (3.1) results in

(A.2) $$\overline{U}_{ijl} = U_{ijl} - \phi l$$

where $U_{ijl} = U(h_{hi}, h_{wj}, C(h_{hi}, h_{wj}, l))$ and U_{ijl} is given by (3.2). Note that $\overline{U}_{ijl}$ differs from U_{ijl} only by the inclusion of the disutility of welfare participation term. The probability that a family chooses the state denoted by δ_{ijl} is given by

(A.3) $$\Pr(\delta_{ijl} = 1) = \Pr(U_{ijl} - \phi l > U_{i'j'l'} - \phi l', \forall i', j', l').$$

That is, the state defined by δ_{ijl} is chosen if it yields the highest utility among all welfare and nonwelfare choices.

Consider the probability in (A.3), taking into account the stochastic disturbances in the model. First, ignore the stigma component ϕ and consider evaluating family utility at a particular value for the unobserved heterogeneity (e.g. $[\theta_h, \theta_w] = [\theta_{hk}, \theta_{wk}]$). Once we condition on values for the unobserved heterogeneity, the problem becomes completely deterministic. That is, utility for each of the feasible work-welfare states can be ordered, and one state will yield the maximal utility. Now consider adding the linear stigma term. Consider the state $\delta_{ij0} = 1$, the off-welfare state with work choices h_{hi} and h_{wj}. Conditional on values for the unobserved heterogeneity, the probability becomes

(A.4) $$\begin{aligned} \Pr(\delta_{ij0} = 1 | \theta_{hk}, \theta_{wk}) &= \Pr(U_{ij0} > U_{i'j'0}\ \forall i', j' \text{ and } U_{ij0} > U_{i'j'1} - \phi, \forall i', j') \\ &= \begin{cases} \Pr(\phi > \max U_{i'j'1} - U_{ij0}) & \text{if } U_{ij0} = \max U_{i'j'0} \\ 0 & \text{otherwise.} \end{cases} \end{aligned}$$

Thus, to choose the nonwelfare state δ_{ij0}, the hours choice must yield the highest utility among *all* nonwelfare states and the disutility from welfare participation must be sufficiently high to ensure that U_{ij0} is also greater than *all* feasible welfare states.

Similarly, consider the on-welfare state $\delta_{ij1} = 1$, characterized by work choices h_{hi} and h_{wj}. Conditional on values for the unobserved heterogeneity, the probability becomes

(A.5) $$\begin{aligned} \Pr(\delta_{ij1} = 1 | \theta_{hk}, \theta_{wk}) &= \Pr(U_{ij1} > U_{i'j'1}\ \forall i', j' \text{ and } U_{ij1} - \phi > U_{i'j'0}\ \forall i', j') \\ &= \begin{cases} \Pr(\phi < U_{ij1} - \max U_{i'j'0}) & \text{if } U_{ij1} = \max U_{i'j'1}, \\ 0 & \text{otherwise.} \end{cases} \end{aligned}$$

Using the normality assumption on ϕ, the probabilities in (A.4) and (A.5) become expressions involving the standard normal distribution function.

Incorporating measurement error and summing over all values for the unobserved heterogeneity, $(\theta_{hk}, \theta_{wk})$, the likelihood function for an individual observation becomes

(A.6) $$l(H_h, H_w, \delta_P)$$

$$= \sum_{k=1}^{M} \pi_k \left\{ \prod_{l=0,1} [\Pr(\delta_{00l} = 1 | \theta_{hk}, \theta_{wk})]^{\delta_{Pl}} \right\}^{(1-\delta_h)(1-\delta_w)}$$

$$* \left\{ \prod_{l=0,1} \left[\sum_{i \neq 0} \sum_{j \neq 0} \Pr(\delta_{ijl} = 1 | \theta_{hk}, \theta_{wk}) g_{H_h}(H_h | h_{hi}) g_{H_w}(H_w | h_{wj}) \right]^{\delta_{Pl}} \right\}^{\delta_h \delta_w}$$

$$* \left\{ \prod_{l=0,1} \left[\sum_{i \neq 0} \Pr(\delta_{i0l} = 1 | \theta_{hk}, \theta_{wk}) g_{H_h}(H_h | h_{hi}) \right]^{\delta_{Pl}} \right\}^{\delta_h(1-\delta_w)}$$

$$* \left\{ \prod_{l=0,1} \left[\sum_{j \neq 0} \Pr(\delta_{0jl} = 1 | \theta_{hk}, \theta_{wk}) g_{H_w}(H_w | h_{wj}) \right]^{\delta_{Pl}} \right\}^{(1-\delta_h)\delta_w}$$

where the indicator variables are defined by

(A.7) $$\delta_h = \begin{cases} 1 & \text{if } H_h > 0, \\ 0 & \text{otherwise,} \end{cases} \quad \delta_w = \begin{cases} 1 & \text{if } H_w > 0, \\ 0 & \text{otherwise,} \end{cases} \quad \delta_{pl} = \begin{cases} 1 & \text{if } \delta_p = l, \\ 0 & \text{otherwise,} \end{cases}$$

and probabilities $\Pr(\delta_{ijl} = 1 | \theta_{hk}, \theta_{wk})$ are defined in (A.4) and (A.5).

The likelihood function for an individual observation represents the probability of observing continuous hours of work H_h and H_w, and the welfare participation choice δ_P. There are four branches in the likelihood function, one for each combination of labor force participation of the husband and labor force participation of the wife. In the first branch, neither the husband nor the wife is working. In the second branch, both the husband and the wife are working and, accordingly, we sum over the part-time and full-time outcomes for both the husband and the wife. The g_{H_h} and g_{H_w} are distributions for measurement error for the husband and the wife derived from the multiplicative measurement error assumption given in (4.4). The third branch applies to families with working husbands and nonworking wives, and the fourth branch applies to families with nonworking husbands and working wives. Note that within each branch, separate probabilities enter for welfare recipients and nonwelfare recipients.

APPENDIX B

TABLE B.I

MEANS AND STANDARD DEVIATIONS OF VARIABLES USED IN WAGE REGRESSION

Variables:	Mean	Standard Deviation
Husband		
Labor Force Participation	0.87	(0.34)
Age	35.26	(8.66)
Age Squared/100	13.18	(6.58)
Years of Education	11.90	(3.29)
Education Squared/100	1.52	(0.71)
Wife		
Labor Force Participation	0.48	(0.50)
Age	32.93	(8.16)
Age Squared/100	11.51	(5.84)
Years of Education	11.50	(3.14)
Education Squared/100	1.42	(0.60)

TABLE B.I—*Continued*

Variables:	Mean	Standard Deviation
Race-Black	0.11	(0.31)
Race-Other Nonwhite	0.08	(0.27)
Local Unemployment Rate	7.41	(2.05)
Local Average Wage (male production workers)	9.98	(1.12)
Urban-Central City	0.36	(0.48)
Urban-NonCentral City	0.51	(0.50)
Number of Children	2.08	(1.14)
Presence of Child Less than 6	0.58	(0.49)

[a]Total number of observations = 1010. All dollar amounts are in 1986 dollars.

TABLE B.II

ESTIMATES OF WAGE EQUATION FOR HUSBANDS[a]

Variable	Selection Equation	Wage Equation
Constant	0.500	0.775
	(0.974)	(0.312)
Age	0.053	0.048
	(0.043)	(0.014)
Age Squared/100	−0.088	−0.044
	(0.055)	(0.018)
Education	0.080	−0.007
	(0.064)	(0.021)
Education Squared/100	−0.118	0.224
	(0.281)	(0.090)
Race-Black	−0.176	−0.138
	(0.181)	(0.056)
Race-Other Nonwhite	−1.011	−0.038
	(0.168)	(0.073)
Unemployment Rate	−0.045	−0.008
	(0.037)	(0.009)
Average Wage	−0.028	0.017
	(0.060)	(0.016)
Urban-Central City	0.156	0.040
	(0.170)	(0.052)
Urban-NonCentral City	0.176	0.094
	(0.167)	(0.049)
Number of Children	−0.099	
	(0.046)	
σ		0.462
		(0.015)
ρ		−0.795
		(0.055)
Likelihood Function	−817.547	
Number of Observations	1010	

[a]Dependent variable is log of average hourly wage rate. Standard errors are in parentheses.

TABLE B.III

ESTIMATES OF WAGE EQUATION FOR WIVES[a]

Variable	Selection Equation	Wage Equation
Constant	−2.997	1.299
	(1.041)	(0.874)
Age	0.087	0.051
	(0.045)	(0.023)
Age Squared/100	−0.109	−0.072
	(0.061)	(0.031)
Education	0.190	−0.071
	(0.089)	(0.064)
Education Squared/100	−0.295	0.537
	(0.389)	(0.224)
Race-Black	0.428	−0.120
	(0.147)	(0.068)
Race-Other	−0.596	0.081
	(0.219)	(0.148)
Unemployment Rate	−0.059	0.023
	(0.026)	(0.012)
Average Wage	0.035	−0.040
	(0.044)	(0.020)
Urban-Central City	−0.087	0.172
	(0.135)	(0.072)
Urban-NonCentral City	−0.125	0.143
	(0.129)	(0.070)
Number of Children	−0.265	
	(0.115)	
Presence of Children Under 6	−0.076	
	(0.044)	
σ		0.411
		(0.176)
ρ		−0.447
		(0.037)
Likelihood Function	−851.521	
Number of Observations	1010	

[a] Dependent variable is log of average hourly wage rate. Standard errors are in parentheses.

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