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

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## ABSTRACT

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 been providing cash benefits to two-parent households since 1961 and recent congressional action has increased its importance. In this model, the husband's and wife's labor supply decisions are constrained by a family budget constraint which is non-convex due to features of the AFDC-UP program. The husband's and wife's labor supply decisions are restricted to no work, part-time work and full-time work. Features of the tax and transfer programs are modeled formally using kinked budget restraints. Maximum likelihood techniques are used to estimate parameters of the underlying hours of work and welfare participation equations. The estimates from the model 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.

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## 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 primarily 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.[1] While this literature has provided insights into how the U.S. welfare system affects the low-income population, it is lacking in one major respect: The research 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). Interest in this program has grown significantly in recent years due to congressional policy action and increased program participation, yet little is known about the program's effect on labor supply and welfare participation among intact families.[2] This paper focuses on this increasingly important segment of the welfare population by using 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.

In the last twenty-five years, participation in AFDC has increased significantly, such that in fiscal year 1990, 11.4 million people received AFDC payments totalling $18.5 billion (U.S. House of Representatives (1992)). Since the program was established in 1935, AFDC 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, known as the Aid

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[1]For recent surveys of the literature on the effects of AFDC on labor supply and welfare participation among female-headed households see Danziger et al. (1981) and Moffitt (1992).

[2]Hosek (1980) used a cross-section of recipients and non-recipients to study participation in the AFDC-UP program. That is the only study known to the author that analyzes labor supply or welfare participation under the AFDC-UP program.

to Families with Dependent Children Unemployed Parent (AFDC-UP) program 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 major legislation passed by Congress. 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.[3] Partially in response to this trend, Congress drafted the Family Support Act of 1988 (FSA) that required all states to extend AFDC benefits to two-parent households by October 1, 1990. This law marks a major change in U.S. welfare policy, a policy that has previously focused on targeting resources to female-headed households. Because the existing literature has focused on single parents, we know virtually nothing about the effect of the AFDC-UP program on family labor supply, income and program participation.

The purpose of this project is to estimate 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. As has been recognized in the literature, the possibility of self selection into welfare implies that we cannot simply attribute the difference in hours worked among participants and non-participants to be the result of the welfare program. Instead, in this analysis, 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.

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[3]For a review of effects of AFDC on family composition, see Moffitt (1992).

In order to examine these issues, I develop a model of labor supply and welfare participation in the presence of the AFDC-UP program. The model used in this paper is an extension of the literature studying the effects of taxes and transfers on labor supply. I employ a static model of labor supply 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 is modeled formally and introduces non-linearities due to features of the tax and transfer programs. Benefits under the AFDC-UP program are a function of the "benefit guarantee" (the maximum payment available if the household has no outside income) and the benefit reduction rate (implicit tax rate on earned income). A high implicit tax rate on earnings in the AFDC-UP program induces a non-convex kink in the family budget constraint that can cause discontinuous labor supply responses to changes in program parameters. Further, adding payroll taxes, federal income taxes, and the Earned Income Tax Credit introduces additional segments and (convex) kinks into 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.[4] The empirical feasibility of this model is achieved through a combination of this discrete formulation of the hours of work decision and 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 in this study 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. In fact, the estimated work disincentive effects of the program and sensitivity of welfare participation are

[4]This approach has been used in many of the recent studies on multiple program participation and labor supply. For example, see Fraker and Moffitt (1988) and Moffitt and Wolfe (1992).

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 0.70. In addition, controlling for the existence of self-selection into welfare, the work disincentive effects are estimated to be quite large: about 47 hours per month for husbands and 32 hours per month 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[5]. At this time, benefits were provided to needy children who were deprived of support due to death, incapacity, or absence of a parent. In 1961, twenty-six years after the program's inception, 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 a permanent provision 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

[5]This section draws on Congressional Research Service (1987), Government Accounting Office (1992a) and Government Accounting Office (1992b). Also see Hoynes (1992) for an expanded version of this section.

unemployed. The program was then changed to the Aid to Families with Dependent Children Unemployed Parent (AFDC-UP) program. 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[6].

The history of state participation in the AFDC-UP program is summarized in Figure 2.1. In 1961 there were thirteen states providing benefits to two-parent families: Connecticut, Delaware, Hawaii, Illinois, Maryland, Massachusetts, New York, Oklahoma, Pennsylvania, Rhode Island, Utah, Washington, and Wisconsin. By 1967, when the program was made permanent, a total of 21 states had established AFDC-UP programs. Since 1975, state participation in the program has remained steady at about 27 states and nine states have provided benefits continuously since the program started (Connecticut, Hawaii, Illinois, Maryland, Massachusetts, New York, Pennsylvania, Rhode Island, and West Virginia). Despite steady *state* participation, 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 pre-FSA caseload is accounted for by five states: California(40%), Michigan (12%), Ohio(11%), New York (5%), and Illinois (5%). 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 (for all families) 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

[6]Specifically, the 1988 Act requires that states provide benefits for a minimum of six months in a calendar year. This applies to new programs only and states with existing programs can not restrict benefits.

in one automobile, not exceed $1000.[7] 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. (Net family income will be defined more fully in the next section.) 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.

Beyond the income and asset tests required of all AFDC families, 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*.[8] 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 definition of unemployment has been in place since 1971, but is currently under review. The Family Support Act of 1988 authorized eight demonstration projects to investigate the implications of relaxing the definition of unemployed. Some of the demonstration projects increase the hours limitation while another eliminates it altogether. Estimates from the family labor supply model are used to simulate the effect of eliminating the work restriction requirement. These results are presented in Section 7.

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[7]This rule is virtually universal, but a few states modify the allowed exclusions as well as the $1000 limit. For details see U.S. Department of Health and Human Services (1984).

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

Despite what appears to be a minor work history requirement, it does imply that all AFDC-UP families contain at least one parent with labor market experience. This can potentially have significant effects on the composition of the recipient population. Program data displayed in Table 2.1 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 families are non-white. 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.[9]

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. This benefit is also known as the benefit guarantee, named because it guarantees a level of income for all eligible families. The benefit levels vary tremendously across states. For example, maximum benefits for a family of four range from a high of $824 in California and $756 in Connecticut, to a low of $248 in South Carolina and $312 in West Virginia.

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

[9]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.

can be as high as 100 percent.[10,11] Non-labor income (such as asset income, unemployment compensation) is taxed at 100 percent with no allowable deductions. 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 receives 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 the well known non-convex kink at the breakeven level of income.

This paper presents estimates of the impact of changes in the AFDC-UP program on welfare participation and hours of work. Specifically, the policy simulations considered are: increasing maximum benefits, reducing the benefit reduction rate, and eliminating the 100 hour rule for the principal earner. The first instrument is set at the state level, and the last two are set federally.

### 3. Economic Model of Family Labor Supply and Welfare Participation

The economic model used in this analysis is a static family labor supply model in which hours worked by the husband and the wife, and welfare participation, are chosen to maximize family utility subject to a budget constraint. The family's optimization problem incorporates labor force participation decisions, hours of work decisions, and welfare participation in a consistent framework. One of the innovations in the literature is the recognition of the simultaneity of labor supply and welfare participation decisions. For example, individuals on welfare are observed to work less than those off welfare, but this cannot be directly attributed to the work disincentive effects of the program since those on AFDC may work less than non-recipients even if they were off the program. The approach used here models the welfare participation decision simultaneously with the labor supply choice thereby controlling for the

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[10]The implicit tax rate on earned income has changed over time but is set uniformly across states. Prior to 1969, the tax rate was 100 percent, it decreased to 67 percent after 1969, and increased back to 100 percent in 1982. California is now considering reducing the tax to 67 percent.

[11]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 increase the implicit tax rate to be over 100 percent.

effects of self-selection into the program.

The family's budget constraint is modeled formally introducing non-linearities due to features of the tax and transfer programs. Though this approach has been used extensively in the literature on the effect of taxes and transfers on the labor supply in the single earner context, the methodological contribution of this paper is that these single earner models have not been extended (in full) to the two-earner case.[12] Most of the 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. The empirical studies that do model joint labor supply allowing for non-working spouse(s) have not accounted for the endogeneity of the tax system.[13] The one exception is Hausman and Ruud (1984) who estimate a joint labor supply model that accounts for the endogeneity of the tax system. However, in their model the only source of stochastic variation is through measurement error in hours of work and no heterogeneity of preferences is modeled.[14]

## 3.1 Family Utility

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.[15]

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[12]For a review of the methodological approaches used in the literature on the effects of taxes and transfers on labor supply of single earners see Heckman and MaCurdy (1981), Killingsworth (1983), MaCurdy et al. (1990).

[13]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.

[14]In a labor supply model with no heterogeneity in preferences, two workers with the same observable characteristics (wage rate, non-labor income, and demographic characteristics) are assumed to make the same labor supply decision. Any dispersion in hours of work results purely from reporting error.

[15]The literature on family labor supply offers a variety of alternative formulations of the family's optimization problem. These approaches are summarized in Killingsworth (1983). The approach used here fits in Killingsworth's classification as a "family utility-family budget constraint" model. That is, utility depends on family consumption and on the leisure of the family members. Alternative formulations include the "male chauvinist" model and the "individual utility-family budget constraint" model (Killingsworth (1983)). In the male chauvinist, or two-stage model, the husband first chooses hours of work given family property income and his own wage. In the second stage, the wife chooses her level of hours of work taking the husband's level of earnings as given and included in property income. In the individual utility-family budget constraint model, individual family members maximize his or her own utility subject to a family budget constraint. The problem with this "gaming" approach is that without repeated trials, it does not ensure that the budget constraint will hold. For a recent summary of the literature on bargaining and family labor supply see McElroy (1990).

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 ($\delta_p$ equals one if the family participates in AFDC-UP). The utility function is assumed to be increasing in consumption, and decreasing with respect to its remaining arguments. The departure from conventional labor supply models lies in the inclusion of the welfare participation indicator in the utility function. The disutility from welfare participation is assumed to represent non-monetary costs such as transactions costs or "stigma" of welfare receipt, and is included to account for non-participation among eligible families.[16] Without allowing for some disutility of welfare participation, the observed non-participation among eligible families would imply that families are locating on an interior point in their budget set and could increase family utility by participating in the AFDC-UP program. Including welfare participation as an argument in the utility function rationalizes the observed non-participation of eligible families.[17]

Following Moffitt (1983), disutility from welfare participation is assumed to be separable from the conventional utility function,

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

The linearity implies that at the same level of hours of work and consumption, a family would prefer not to be on welfare due to the disutility associated with participation in welfare, equal to $\phi$. The separable form implies that the disutility affects the decision to participate in AFDC-UP, but does not affect the labor force decision conditional on welfare receipt.

The utility function is assumed to be Stone-Geary,

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[16]This approach was introduced by Moffitt (1983). He interpreted the estimated disutility as a stigma effect but recognized that in this formulation of the model, a stigma effect can not be separately identified from any non-monetary cost associated with welfare receipt.

[17]In the dataset used in this analysis, for example, one quarter of the families that satisfy all requirements for AFDC-UP at observed hours of work are not participating in the program. Moffitt (1983) found that fifty-five percent of eligible female-headed households were not participating in AFDC. The higher take-up rate found here may be due to more accurate imputation of eligible status (I impose the asset test while Moffitt does not). In addition, the principal earner's work restriction significantly reduces the size of the eligible population. Disregarding this requirement, the take-up rate decreases from 75 percent to 40 percent.

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

$$\begin{aligned} \text{where} \quad & \gamma_i - h_i > 0, \quad i = h, w, \\ & C - \gamma_c > 0, \\ & 0 < \beta_i < 1, \quad i = h, w, c, \quad \text{and} \\ & \beta_h + \beta_w + \beta_c = 1. \end{aligned} \tag{3.2}$$

The adding up condition on the $\beta$'s is an arbitrary normalization of the utility function. The $\beta$'s are assumed to be non-negative to ensure that utility is increasing in consumption and decreasing in hours worked by the husband and the wife. The $\beta$'s in the Stone-Geary model have the interpretation of marginal propensity to consume non-market time ($\beta_h$,$\beta_w$) or consumption goods ($\beta_c$) out of non-labor income. Though it is not necessary to maintain this interpretation, the $\gamma$'s are often depicted as threshold or reference values. For instance, $\gamma_h$ and $\gamma_w$ can be interpreted as upper bounds on hours worked.

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 in this analysis relies solely on the direct utility function and does not make use of either the indirect utility function or the hours equation.

Maximization of (3.2) subject to a linear budget constraint with fixed wages $w_h$, $w_w$ and non-labor income, $N$, implies the following form for the labor supply functions for the husband and wife:

$$h_i = \gamma_i - \frac{\beta_i}{w_i}\left(N + w_h\gamma_h + w_w\gamma_w - \gamma_c\right), \quad i = h, w. \tag{3.3}$$

The implied uncompensated wage elasticities ($\epsilon_i^u$), compensated wage elasticities ($\epsilon_i^c$), and cross substitution elasticities ($\epsilon_{ij}^c$) are

$$\epsilon_i^u = \frac{\gamma_i}{h_i}(1-\beta_i) - 1, \qquad \epsilon_i^c = (1-\beta_i)\left(\frac{\gamma_i - h_i}{h_i}\right), \quad \text{and}$$
$$\epsilon_{ij}^c = -\frac{\beta_i}{w_i}(\gamma_j - h_j) \qquad i,j = h,w. \tag{3.4}$$

The total income elasticities (or marginal propensity to consume non-market time out of non-labor income) for the husband and wife are $\beta_h$ and $\beta_w$, respectively.[18] Therefore, if non-labor income increases by a dollar, the husband will increase the value of non-market time consumed by $\beta_h$ (or equivalently decrease value of work effort by $\beta_h$) and the wife will increase the value of non-market time consumed by $\beta_w$. The remainder is consumed in market goods, $\beta_c = 1-\beta_h-\beta_w$.[19]

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.[20]

## 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 non-labor income. The family budget constraint is:

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[18]The total income elasticity is equal to the income elasticity times ratio of earnings to non-labor income. Specifically, the marginal propensity to earn is equal to $\frac{\partial(hw)}{\partial N} = \frac{\partial \ln h}{\partial \ln N} * \frac{wh}{N}$.

[19]It is important to note that while it is intuitively helpful to see the implied hours equations and their accompanying elasticities, these are all derived from a linear budget constraint. We are considering a complicated non-linear budget constraint where these elasticities apply only within linear segments.

[20]For a survey of empirical studies on family labor supply, including estimates of cross-wage elasticities, see McElroy (1981) and Killingsworth (1983). Recent studies that find the leisure time of the husband and wife to be net substitutes include Ransom (1987) and Hausman and Ruud (1984).

$$C = w_h h_h + w_w h_w + N + B_A(N, E_h + E_w)\ \delta_p - T(N, E_h, E_w)\ , \tag{3.5}$$

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

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 tax rate (or benefit reduction rate), and an increase in unearned income decreases benefits one to one.[21] 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 ($\delta_p = 1$).[22]

If the family chooses to participate in the AFDC-UP program, food stamp benefits are also assigned to the family. As mentioned above, 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). 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.[23] The budget constraint in (3.5) also incorporates features of the federal tax system via the non-linear 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 $\delta_p$ by maximizing family utility (3.1), subject to the budget

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[21] As discussed in Section 2.2, the statutory tax rate is 67% or 100% depending on work expenses. The statutory rate differs from the effective rate due to earnings exclusions.

[22] Hours of work for the principal earner are represented by $h_p$, and while there is only one principal earner per family, it can be either the husband or the wife. See Section 2.1 for details of the eligibility restrictions.

[23] AFDC-UP benefits are counted as income in calculating food stamp benefits. The reverse is not true. Increases in net family income reduce food stamp benefits at a 30 percent rate. Net income differs from gross income through earnings, child care and shelter deductions. For more information on the food stamp program see U.S. Department of Agriculture (1991).

constraint in (3.5). Given the complexity of the two-earner problem in the presence of the non-linear 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.[24] Whereas the primary reason for this simplification is empirical tractability, 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. It is important to note that using a discrete choice approach to the labor supply decision will likely dampen the estimated effects of changes in the transfer program on hours of work since all intra-class movement will be missed. However, with this caveat in mind, one could argue that it is the inter-class movements that are ultimately of interest. Given that most AFDC-UP recipients are not working, 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.

As a result of the discrete choice approach, 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 for the household. Adding the welfare participation choice leads to a total of 18 work-welfare possibilities. For individual families, 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 (3.5) at each combination of the husband's hours ($h_h$), the wife's hours ($h_w$), and welfare participation ($\delta_p$), and

[24]Non-linearities in the budget constraint, even in the single-earner case, can easily 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 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 the addition of an additional potential wage earner. For a general review of deriving the distribution for hours of work in the kinked budget constraint context see MaCurdy et al. (1990).

choosing the state that yields the highest utility.[25]

## 4. Empirical Specification

The economic model of family labor supply and welfare participation, described above in Section 3, takes the form of a discrete choice model with a total of eighteen possible work-welfare states. 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 distastes for work (for the husband and the wife) and heterogeneity among households in distastes for welfare. Heterogeneity in distastes for work is introduced through the $\beta$ parameters in the Stone-Geary utility function given in (3.2) where it is assumed that:

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

where the elements of the vector $X$ are observed covariates and the $\theta$'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 $\beta$'s is a convenient method to impose parametrically the inequality restrictions. In addition, this formulation allows the impact of a given element of $X$ to vary depending on the absolute and relative magnitudes of the $\beta$'s.

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[25]The expansion of the AFDC-UP program was largely a response to the increase in the incidence of female headed households among the low-income population (U.S. Government Accounting Office (1992b), Congressional Research Service (1987)). By extending benefits to two parent families, the "incentive" to keep families together increases. The current analysis focuses on the work disincentive effects of the UP program and does not attempt to address the impact of expanding the UP program on family composition. Further, this approach also conditions on locating in a UP state and does not attempt to address issues of benefit driven migration decisions. For a summary of the literature on the effects of AFDC on migration and family structure see Moffitt (1992).

The parameters $\theta_h$ and $\theta_w$ represent unobservable differences in preferences for work. 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 $\pi_k$. That is, the distribution for unobserved heterogeneity in preferences for work takes a discrete form with,

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

Both the points of support for the joint discrete distribution $\{ (\theta_{hk},\theta_{wk}),k=1,..M \}$ and the associated probabilities $\{ \pi_k,k=1,..M \}$ are estimated as parameters in the model.[26] All else equal, higher values in the unobserved heterogeneity elements $(\theta)$ generally imply greater valuation of leisure time $(\beta)$ 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 $\alpha_h$ and $\alpha_w$ and the relative magnitudes of $\beta_h$ and $\beta_w$.

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

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

where $v \sim N(0, \sigma_s^2)$. The elements of the vector $Z$ are observed covariates and $v$ represents variables that are unobserved by the researcher that affect the welfare participation decision. The $Z$ vector contains family variables such as age and education of the household head, and number of children. It is assumed that $v$ is independent of the unobserved components of the distaste for work ($\theta$'s).

Measurement error in hours worked by the husband and wife is included to account for the differences between actual hours and reported hours. 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,

[26]The distribution is not non-parametric in the sense that the number of points of support of the distribution is fixed prior to estimation.

$$H_h = e^{\varepsilon_h} h_h \quad \text{and}$$
$$H_w = e^{\varepsilon_w} h_w \,, \tag{4.4}$$

where $\varepsilon_i \sim N(-\frac{\sigma_i^2}{2}, \sigma_i^2)$ . This multiplicative form for measurement error (MaCurdy *et al* 1990) 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.[27]

In this model, computational simplicity is achieved through a combination of two factors: the discrete hours choice and the discrete form for the unobserved heterogeneity in preferences for work. Recall that the family labor supply and welfare participation decisions are modeled in a discrete choice framework where the husband and wife each choose from no work, part-time, and full-time work, leading to a total of eighteen work-welfare states. Adopting a discrete choice formulation for the hours of work decision eliminates the problems associated with determining maximal utility on each segment of the budget constraint, something which is required when modeling continuous hours of work with a non-convex budget constraint.[28] In the discrete choice model, family utility (3.1) is evaluated at each combination of the husband's hours, the wife's hours, welfare participation, and (through the budget constraint in (3.5)) family consumption. The family then chooses the state with the highest utility.

Each family's contribution to the likelihood function is the probability that their observed choice of hours and welfare participation was chosen given their wages, family characteristics, and parameters of the tax and transfer programs. To derive these probabilities consider separating the family's optimization problem into two sub-problems where in each sub-problem, the family makes labor supply choices for the husband and wife conditional on welfare participation status. For a family to choose to participate in welfare with hours choices $(h_{hi},h_{wj})$ they must satisfy two conditions: The hours choice

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

[28]Depending on the exact position of the kinks and segments in the budget constraint, some segments can be logically eliminated from the choice set. In that case, maximal utility need only be determined for some subset of the segments.

must yield the highest utility among all welfare choices and the disutility of participating in welfare ($\phi$ in (3.1)) must be sufficiently low to ensure that the maximum utility on welfare is higher than all non-welfare choices. Similarly, choosing non-participation with hours ($h_{hi}$,$h_{wj}$) requires that the hours choice must yield the highest utility among all non-welfare 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" is intuitively appealing and will be important to remember when going over the policy simulations in Section 7. This probability can easily be constructed given values for the unobserved heterogeneity. 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 (as opposed to integration in the continuous case) over all values for the unobserved heterogeneity. Appendix A contains a more complete derivation of these probabilities and the resulting likelihood function.

The empirical specification of the family labor supply model incorporates three sources of stochastic disturbances: heterogeneity in distastes for work by the husband and the wife, and heterogeneity in distastes for welfare. Suppose all three forms of heterogeneity were modeled as continuous distributions. Implementing the model would require not only evaluating a trivariate integral, but also solving for the limits of integration for each of the probabilities with respect to the three stochastic disturbances. It is the second requirement that can easily make the problem intractable. Instead, by assuming a discrete distribution for each of the two components of the unobserved heterogeneity in preferences for work, the empirical implementation of the model is greatly simplified.

Considering the above discussion, why do we maintain a continuous distribution for unobserved heterogeneity in distastes for welfare participation? It is because welfare participation acts as a "regime" shift variable that a continuous distribution for the unobserved heterogeneity in distastes for welfare is easily implemented. 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. In this formulation, a continuous distribution is intuitively appealing and easily implemented.

In sum, the parameters to be estimated in the unconstrained model include the threshold parameters in the utility function ($\gamma$'s), the parameters representing the heterogeneity of preferences for work ($\theta$'s, $\pi$'s, $\alpha_h$, and $\alpha_w$), the parameters representing heterogeneity of preferences for welfare participation ($\alpha_s$,$\sigma_s^2$), and measurement error parameters ($\sigma_h^2$,$\sigma_w^2$).

## 5. Data

### 5.1 Survey of Income and Program Participation

The dataset used for this study 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 is particularly well suited for a study of the AFDC-UP program as it 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. During the time period covered by the 1984 SIPP, the AFDC-UP program was available in 26 states and this analysis will concentrate on families in these states who could potentially be eligible for the benefits under the AFDC-UP program.

The estimation sample includes families satisfying the following selection criteria: (1) family contains a married couple (with both spouses present) with at one child less than 18 in the household, (2) family has countable assets less than $1000, (3) family resides in one of the twenty-six states offering AFDC-UP as of the survey period, and (4) family contains at least one parent that satisfies the AFDC-UP

work history requirement (see Section 2). 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. Within this sample, *recipient* families are those who report receiving AFDC benefits.[29]

Data from two interview months in the SIPP are combined with asset data (collected in Wave 4) and work history data (collected in Wave 5) to create the eligible and recipient populations for the analysis. Table 5.1 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. Table 5.1 shows the rather dramatic differences between recipient and non-recipient 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 non-recipient families. In addition, labor force participation for both husbands and wives is much lower among welfare recipients. Table 5.2 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 non-recipient families. Clearly hours of work are lower among welfare recipients: Average hours of work for male recipients are a mere 8 hours per month compared to 161 hours among non-recipient males. However, this cannot be interpreted as the disincentive effect of AFDC-UP because families are likely to be self-selected in the welfare recipient group. Measuring the work disincentives requires comparing hours of work for welfare recipients with what their hours would be in the absence of the program.

[29]Families with sufficiently high non-labor 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. Students and elderly parents are dropped due to their potential limited attachment to the labor market. Self-employed individuals are dropped due to difficulties in constructing hourly wages while families reporting negative unearned income are excluded due to problems in applying benefit formulas.

These results will be presented in the next section.

In this analysis, 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. As described in Section 3, the primary reason for adopting a discrete choice approach is empirical tractability. However, the data on monthly hours of work from the SIPP, as shown in Figure 5.1, suggest that hours of work choices are concentrated at a few points and a discrete choice model may not be a significant simplification of the labor supply choice. Thirteen percent of all men and just over half 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.

The family labor supply model presented in Section 3 requires a gross wage rate for both the husband and wife regardless of current work status. Unfortunately, we observe wages only for those who work. Accordingly, log-linear wage equations for the husband and wife are estimated accounting for potential sample selection bias.[30] Summary statistics for the wage regression dataset are provided in Appendix table B.1. Estimates for the wage equations are presented in Appendix tables B.2 and B.3. 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 using the parameter estimates in Tables B.2 and B.3. To maintain a consistent stochastic specification, the wage equation estimates are used to predict wages for both workers

[30]This reduced form method for imputing wages for non-workers is distinct from the model of labor force participation discussed in Section 3. 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.

and non-workers.[31] Predicted hourly wages average $10.23 for men and $7.44 for women with AFDC-UP participants having lower average predicted wages than non-participants.

All variables used in this analysis are constructed using monthly data from the SIPP. However, one should be wary of using monthly data for a static labor supply analysis since it is assumed that the family's budget constraint holds with equality. That is no saving or dissaving is admitted, an assumption more difficult to accept when using monthly as opposed to quarterly or annual data. However, monthly data are attractive because the transfer programs analyzed here structure eligibility and benefit rules based on monthly data. Furthermore, while SIPP allows aggregating the monthly data to longer time frames, changes in family composition, welfare participation, and labor force participation can complicate and confuse this process. In this study, restricting the sample to exclude students, retirees, high asset and non-working households with no sources of income (as described above) will hopefully minimize the presence of families who routinely depend on existing wealth to support current consumption.

## 5.2 Parameters of Tax and Transfer Programs

The last section of Table 5.1 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 non-recipients). 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.[32] 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,

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[31]Using predicted wages implies that the budget constraint is not observed perfectly. One could argue that wages should then be predicted only for non-workers to minimize the number of observations with estimation error in the budget constraint. However, this asymmetric treatment of workers and non-workers could induce spurious differences in the distribution of wages across the two groups.

[32]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.

federal income taxes, and the Earned Income Tax Credit (EITC).[33]

Table 5.1 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 non-recipients. The average net wage for husbands in recipient families is $3.16 compared to $7.34 for non-recipients.

## 6. Estimation Results

This section provides estimates for the family labor supply and welfare participation model outlined in Sections 3 and 4. All results were estimated using maximum likelihood techniques. The distribution representing unobserved heterogeneity in preferences for work by the husband and wife is estimated with four points of support.[34]

Two specifications of the model were estimated, the results of which are presented in Table 6.1. In the first specification, all families are assumed to have the same distribution of distastes for welfare (e.g. $\phi_i \sim N(\mu,\sigma_s^2)$), while the second allows for heterogeneity in the distribution of disutility of welfare participation by introducing the vector of covariates, $Z$ (e.g. $\phi_i \sim N(Z_i'\alpha_s,\sigma_s^2)$). The results from Model 2 show 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, smaller families, white families, and families with older parents. These results are qualitatively similar to those found by Moffitt (1983) for female-heads of household. However, unlike Moffitt, adding family characteristics to the disutility component does not provide any explanatory power to the model. Accordingly, the remainder

[33]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.

[34]Accordingly, the discrete distribution in (4.2) has four $(\theta_{hk},\theta_{wk})$ pairs and $M=4$.

of the results in this section will be based on the estimates in Model 1.[35]

The parameters representing heterogeneity in preferences for work include the points of support of the distribution of unobserved heterogeneity ($\theta_h$,$\theta_w$); the probabilities associated with these points of support ($\pi$); and the coefficients representing the effects of family characteristics on preferences for work ($\alpha_h$,$\alpha_w$). The estimates in Table 6.1 show that most of the family characteristics representing heterogeneity in distastes for work are not individually significant. However, the appropriate likelihood ratio test implies that the elements of the $\alpha_h$ and $\alpha_w$ vectors are jointly significant and the model estimates are improved by including family characteristics in preferences for work.

The estimates of the model imply large variability in distastes for work among the population of two-parent households potentially eligible for AFDC-UP benefits. The vectors $\theta_h$ and $\theta_w$ represent the unobserved components in preferences for work which when combined with the $\alpha$ vectors in the logistic parameterization (4.1), form the utility function parameters $\beta$. For a given household with covariates $X_i$, each value for the unobserved heterogeneity implies a different estimated value for the preference parameter vector $\beta$. Average values for $\beta_h$, $\beta_w$, and $\beta_c$ 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 non-market time (leisure) or consumption goods out of non-labor income. Therefore, if non-labor 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 (though 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.

Preferences for work vary with family characteristics through the parameter vectors $\alpha_h$ and $\alpha_w$. A positive coefficient implies that an increase in this covariate increases $\beta$, and consequently, reduces

[35]The likelihood ratio test statistic for the joint significance of education, age, number of children and race in the disutility term is 5.18 implying that I can not reject the null hypothesis that the four parameters are jointly equal to zero at the 10 percent level. These family characteristics are not only statistically insignificant but also small in magnitude and the model predictions do not change appreciably if the results from Model 2 are used.

work effort. The estimates show that, holding wages constant, the husband's work effort increases with his own education and the number 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 education level and negatively related to the presence of a young child and to her own and her husband's age. Further, husbands in non-white families have lower work effort than their white counterparts, while wives in non-white families have higher work effort.

The parameter estimates, while interesting in their own right, are not of *direct* interest in this project. We are interested in using the model to estimate the economic significance of the AFDC-UP program with respect to its effect on family labor supply, family after-tax and transfer income and welfare participation. This is done through simulations which are presented in the next section. However, for the interest reader, Hoynes (1992) provides a more detailed discussion of the estimated distribution of unobserved heterogeneity and the effect of family characteristics on work effort.

## 7. Policy Simulations

This section explores the implications of the model by simulating the effects of changes in AFDC-UP eligibility and benefit rules on welfare participation and family labor supply. The simulation results are used to answer the primary questions posed in this study: How do changes in the structure of AFDC-UP eligibility and benefits affect family labor supply and welfare participation? What are the work disincentive effects of the program? How are family incomes affected by the program? In particular, this section presents estimates of the impact of the following changes in the AFDC-UP eligibility and benefit structure on average labor supplied and the probability of participation in welfare:

- increasing the maximum benefit available under AFDC-UP ($G_A$),
- decreasing the implicit tax rate on earnings ($t_A$),
- eliminating the work restriction for the principal earner, and
- eliminating the AFDC-UP program entirely.

Table 7.1 summarizes the results of the simulations by presenting the average probability of participation

in AFDC-UP as well as 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 the estimates of the model 1 in Table 6.1.[36]

*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 quite closely. These "baseline estimates" are displayed in the first column of Table 7.1 and are used as the point of comparison for all policy simulations. The predicted welfare participation rate is 8.6 percent, slightly lower than the 8.9 percent observed in the data. A total of about 11 percent of the sample is predicted to be eligible to receive welfare benefits implying that a fifth of those who are eligible for benefits are not participating in the program. Predicted employment rates and average hours worked are presented by welfare participation status. Overall, about 86 percent of the husbands and 49 percent of the wives are predicted to participate in the labor market compared with only 8 percent of the men and 5 percent of the women for those on welfare.

*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, decreases average hours of work in the population. The results of increasing the maximum benefit are shown in the second column of Table 7.1. Increasing the maximum benefit ($G_A$) by 20 percent increases participation in AFDC-UP to 9.8 percent, an increase of about 14 percent. This increase implies an elasticity of the probability of welfare participation with respect to the benefit guarantee of about 0.70. The magnitude of the estimated elasticity shows that two-

[36]For given values of the family variables (wages, non-labor income, and demographic characteristics) and AFDC-UP program parameters, we can use the model estimates from Section 6 to predict the probabilities for each of the work-welfare choices. We create average probabilities 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.

parent families are slightly 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.[37]

Increasing maximum benefits unambiguously increases the probability of participation through a pure income effect. However, it is possible to have small income effects (and hence a small reduction in labor supply) yet still have a significant increase in welfare participation. How? By increasing benefits, the breakeven point increases and many families become eligible for AFDC-UP *without* changing their hours of work. This analysis allows us to identify the *mechanical* and *behavioral* effects of the increase in benefits (Ashenfelter (1983)). The increase in participation due to the increase in the breakeven point is considered a mechanical effect. For others the increase in benefits may cause a discontinuous reduction in hours of work thus rendering them eligible for welfare. These families also contribute to increases in welfare participation, but do so through behavioral effects. A reduced form approach to the problem can only identify how total participation increases when benefits increase and cannot identify the relative importance of mechanical versus behavioral effects.[38] In this analysis, about half the increase in participation is attributed to families who become eligible through reducing hours of work (we will refer to these families as "switchers"). Hours worked among switchers were reduced quite significantly from 79 hours per month (under current law) to 33 hours per month (after increasing benefits by 20%) for men and from 68 to 17 hours per month for women.

Returning to Table 7.1, increasing the guarantee decreases average hours worked in the entire population. However, because welfare recipients comprise a small fraction of the total population, the overall decrease is not large. The results for welfare participants imply that employment actually

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[37]In our model, the benefit elasticity is not specified as a parameter. However, simulating changes in the maximum guarantee of 5, 10, 15, and 25 percent imply similar elasticity estimates.

[38]One of the primary goals of this analysis is to determine the effect of the AFDC-UP program on family labor supply and family income levels. Specifically, how would family income change if the program were eliminated? Clearly, addressing these "out of sample" predictions requires imposing some sort of structure on the problem. On the other hand, one can identify the effect of increasing benefits through cross-sectional variation in benefits. I estimated a probit model of AFDC-UP participation and found that the predicted effects of changes in benefits on welfare participation matched the estimates from the structural model quite closely (Hoynes (1992)).

*increases* in the welfare population. Why? The recipient population consists of new entrants and those families participating under current law. Through a pure income effect, increasing the maximum benefit reduces hours of work for both new entrants and the existing welfare population. The labor supply response among existing recipients is small, which is not surprising given that 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 higher work effort while on welfare is higher than that in the existing welfare population. Therefore, through a change in the composition of recipients, average work effort among all welfare recipients increases. This result highlights the importance of modeling welfare participation simultaneously with labor supply decisions. Studies that use a population of current recipients to estimate labor supply effects of a change in program parameters overlook all entry (and exit) effects.

*Decreasing Implicit Tax Rate on Earnings*

Decreasing the AFDC-UP benefit reduction rate affects both welfare participation and family labor supply, but to a lesser extent than with changing the maximum benefit level. The third column of Table 7.1 shows the results of decreasing the implicit tax rate on earnings by 20 percent. Unlike the pure income effect associated with changing the maximum benefit, the effects on labor supply are dampened by the fact that decreasing the tax rate (like increasing wages) induces both an income and substitution effect. Table 7.1 shows that an increase in the implicit tax rate increases eligibility more than with the increase in maximum guarantee, but the associated increase in participation is lower. Why? The decrease in the implied tax rate on earnings implies a smaller average increase in benefits compared with the simulated increase in the program guarantee. Recall from section 4 that a family will participate in welfare is the disutility of welfare participation does not exceed the difference between maximum utility on welfare and maximum utility off welfare. While reducing the benefit reduction rate implies that more families lie below the breakeven point (i.e., more are eligible) their potential gain to receiving welfare is lower, and thus the increase in participation is not as large.

*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 provisions in the 1988 Family Support Act imply that this restriction is under review.[39] One of the advantages for using a structural model is that by recovering the underlying parameters of the utility function one can simulate the effect of changing a provision that exhibits no variability across families. A reduced form approach could not identify this effect.

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 7.1, 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 from 11 to 15 percent. However, participation increases marginally from 8.6 to 8.9 percent. Why? An increase in maximum benefits increases attainable income at every hours of work choice. Eliminating the 100 hour rule, on the other hand, only affects the income attainable at *full time* labor supply choices. Any resulting 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. So the increase in eligibility reflects the fact that many low wage individuals are eligible for benefits even while working full time. However, for a family to choose to participate in welfare, the utility gain associated with the increase in income must outweigh the implied disutility of being on welfare. Here, the potential gain is so 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) that the disutility of participation, be it transactions costs or

[39]The Family Support Act of 1988 authorized eight demonstration projects to investigate the implications of relaxing the work restriction. Some of the demonstration projects increase the hours limitation while another eliminates it altogether.

stigma, dominates and few families choose to participate.[40]

*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 7.2, imply large work disincentive effects of the AFDC-UP program. Average hours worked under current law is 149 hours for men off welfare, compared with 6.5 hours per month for men on welfare, a difference of 143 hours. For women the difference is 79.4 hours, 83.6 for those off welfare compared with 4.2 for those on welfare. These differences cannot be attributed purely to the work disincentive effects of the program because participants may well differ from non-participants in observable (as well as unobservable) characteristics. The descriptive statistics in Table 5.1 show, for example, that welfare participants tend to be older, less educated, have larger families, and, most importantly, have lower wages.

Instead, the work disincentive effects are estimated to be the difference between predicted hours under current law and hours worked in absence of the program.[41] Eliminating the UP program causes hours worked to increase to 53.4 for men and 35.8 hours for women resulting in work disincentive effects of the AFDC-UP program of 46.9 hours per month for men (53.4 - 6.5) and 31.6 hours per month for women (35.8 - 4.2). These results imply that the work disincentive effects of the AFDC-UP program are larger than those estimated for female-heads. The surveys of Danziger *et al.* (1981) and Moffitt (1992) report work disincentives of female heads on AFDC between 4 and 40 hours per month, with the 40 hour estimate considered an outlier (see note 13 of Moffitt (1992)).

Despite the large estimated work disincentive effects, there is strong evidence of self selection into welfare. As was found in the literature on female heads, welfare recipients have a significantly lower propensity to work than those off welfare even in the absence of the program. For example, under the

[40]This simulation is likely to be sensitive to the choice of three hours of work points. The model can be extended by providing additional hours of work choices to determine the robustness of this result.

[41]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.

current system, husbands in non-welfare families work, on average, 143 hours per month more than husbands on welfare (149.3 - 6.5). If AFDC-UP was eliminated, hours worked among welfare recipients would increase significantly (as reflected in high estimated work disincentive effects) but 65 percent 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 (149.3 - 53.4).

Finally, these results imply that if the AFDC-UP program was eliminated, hours of work would not increase sufficiently to make up for the loss in welfare benefits. Family income (after tax and transfer income) under current law averages $805 for welfare recipients. Despite the increase in work effort, family income among previous recipients falls to $731 when the program is eliminated. In fact, in the absence of the program almost seventy five percent of previous AFDC-UP recipients would still be eligible for benefits.[42]

## 8. Conclusions

In this paper, I have estimated a model of family labor supply and welfare participation using data on two-parent families with children from the 1984 Survey of Income and Program Participation. The husband's and wife's labor supply decisions are constrained by a family budget constraint which is non-convex due to high implicit tax rates in the AFDC-UP program. Features of the tax and transfer programs are modeled formally using kinked budget constraints. The estimates from the model are used to determine the magnitude of the work disincentive effects of the AFDC-UP program, and to simulate the effects of changes in the eligibility and benefit structure on family labor supply and welfare

[42]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 presented in Section 7 are an upper bound on the actual effect. The model was also estimated allowing for the husband and/or wife to be constrained at zero hours of work with the probability of being constrained estimated as a parameter in the model. Using estimates from the rationing model, the work disincentive effect for men drops by 24 percent to 35.5 hours per month (44.3 - 8.8). The work disincentive effect for women does not change appreciably and is estimated be 32.7 hours per month (45.6 - 12.9). See Hoynes (1992) for further discussion of estimates from the rationing model.

participation.

The results in this study 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. Estimated work disincentive effects of the AFDC-UP program are about 47 hours per month for husbands and 32 hours per month for wives. The disincentive effects are constructed by comparing hours worked by welfare recipients under current law to hours they would have worked in absence of the program thus controlling for self-selection into welfare. The elasticity of the probability of AFDC-UP participation with respect to the maximum benefit is estimated to be 0.70. That is, when benefits are increased by 20 percent, estimated welfare participation increases by 14 percent. Further, the results show that eliminating the principal earner work restriction, as proposed by Congress in the Family Support Act of 1988, 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.

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 five percent of previous AFDC-UP recipients would retain eligibility for welfare benefits. This provides strong evidence of self-selection of families into welfare as AFDC-UP recipients have a significantly lower propensity to work even in the absence of the program.

By looking at program data alone, it is clear that AFDC-UP recipients are quite different from female-headed households receiving AFDC. For example, 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 significantly 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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**Figure 2.1**
**State Participation in the Aid to Families with Dependent Children - Unemployed Parent Program, 1961-1988**

| Year[1]: | 61 | | | 65 | | | | 70 | | | | | 75 | | | | | 80 | | | | | 85 | | | | 88 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alaska | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Arizona | | | x | | | x | | | | | | | | | | | | | | | | | | | | | |
| Arkansas | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| California | | | | | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Colorado | | | | | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | | | |
| Connecticut | x | x | x | x | x | x | x | x | | | | | | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Delaware | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| District of Columbia | | | | | | | | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Florida | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Georgia | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Hawaii | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Idaho | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Illinois | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Indiana | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Iowa | | | | | | | | | | | | | x | | x | x | x | x | x | | x | x | x | x | x | x | x |
| Kansas | | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Kentucky | | | | | | | | | | | | | | x | x | | | | | | | | | | | | |
| Louisiana | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Maine | | | | | | | | x | x | | x | | | | | | | | | | | | | x | x | x | x | x |
| Maryland | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Massachusetts | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Michigan | | | | | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Minnesota | | | | | | | | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Mississippi | | | | | | | | | | | | | | | | | | | | | | | | | | | |

**Figure 2.1** (continued)

| | 61 | | | | 65 | | | | 70 | | | | 75 | | | | 80 | | | | 85 | | | 88 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Missouri | | | | | | | | | x | x | | | x | x | x | x | x | x | | | x | x | x | x | x | x |
| Montana | | | | | | | x | x | | | | x | | x | x | x | x | x | x | | | | x | x | x | x |
| Nebraska | | | | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Nevada | | | | | | | | | | | | | | | | | | | | | | | | | | |
| New Hampshire | | | | | | | | | | | | | | | | | | | | | | | | | | |
| New Jersey | | | | | | | | x | x | | | | | | | x | x | x | x | x | x | x | x | x | x | x |
| New Mexico | | | | | | | | | | | | | | | | | | | | | | | | | | |
| New York | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| North Carolina | | x | | | | | | | | | | | | | | | | | | | | | | | | |
| North Dakota | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ohio | | | | | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Oklahoma | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | | | | | | | | | | | |
| Oregon | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | | | | | | x | x | x |
| Pennsylvania | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Rhode Island | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| South Carolina | | | | | | | | | | | | | | | | | | | | | | | x | x | x | x |
| South Dakota | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Tennessee | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Texas | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Utah | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | | | | | | |
| Vermont | | | | | | | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Virginia | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Washington | x | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | | | x | x | x | x | x |
| West Virginia | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Wisconsin | | | | | | x | x | x | | | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x | x |
| Wyoming | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | 13 | 14 | 16 | 15 | 15 | 22 | 21 | 23 | 23 | 25 | 24 | 24 | 24 | 25 | 27 | 27 | 27 | 27 | 26 | 26 | 22 | 22 | 24 | 25 | 26 | 27 | 27 | 27 |

[1]Data for 1965 is missing and is assigned values for 1964.

Source: Congressional Research Service (1987), Table 1.

**Figure 5.1**
**Empirical Distribution of Hours Worked by Husbands and Wives**

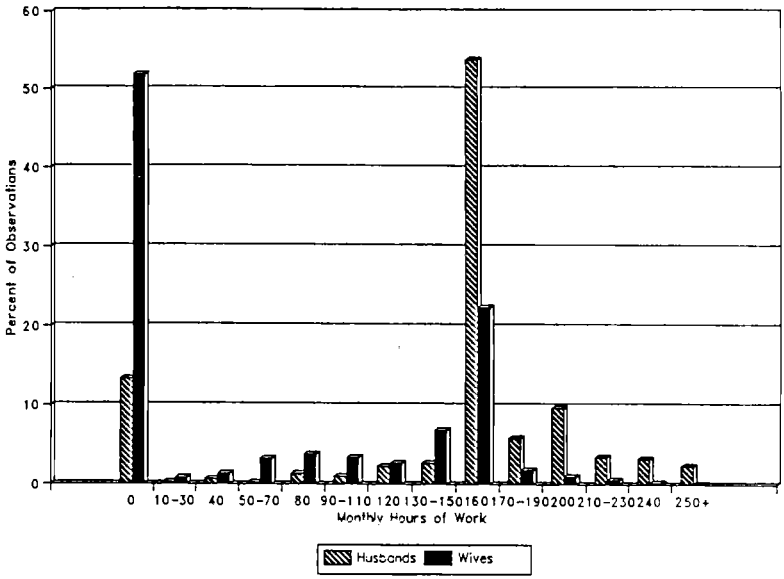

**Table 2.1**
**Characteristics of Families Receiving AFDC Benefits,**
**Comparison of UP Families with Female-Headed Families, FY1987**

| | 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 |
| 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 |
| Housing Tenure Type | | |
| Renter | 72.2% | 73.6% |
| Owner | 3.9 | 11.1 |
| Public Housing / Subsidy | 23.9 | 15.3 |
| Percent with Earned Income | 19.4% | 30.5% |
| Percent with Non-AFDC 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, p. 569-570 and U.S. Department of Health and Human Services (1987).

**Table 5.1**
**Means and Standard Deviations of Variables Used in Estimation, By AFDC-UP Participation Status**

| Variables: | Participants | | Non-Participants | |
|---|---|---|---|---|
| | 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) |
| Minority Status (1=minority) | 0.467 | (0.502) | 0.153 | (0.360) |
| Principal Earner (1=husband) | 0.856 | (0.354) | 0.872 | (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) |

[1]Total number of observations = 1010. Income and benefit levels are monthly. All dollar amounts are in 1986 dollars.

Table 5.2
Work Status of Husband and Wife by AFDC-UP Participation Status

| | Participants | Non-Participants | 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 |

[1]Total number of observations = 1010.

**Table 6.1**
**Results from Estimating Model of Welfare Participation and Family Labor Supply**

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| | Estimate | Standard Error[1] | Estimate | Standard Error[1] |
| $\alpha_h$: | | | | |
| Education of Husband[2] | -0.447 | (0.944) | -0.470 | (0.508) |
| Education of Wife[2] | 0.377 | (1.105) | 0.347 | (0.681) |
| Age of Husband[2] | 0.066 | (0.537) | 0.080 | (0.283) |
| Age of Wife[2] | -0.070 | (0.519) | -0.125 | (0.331) |
| Number of Children[2] | -0.151 | (0.254) | -0.149 | (0.161) |
| Presence of Children <6 | -0.381 | (0.460) | -0.312 | (0.387) |
| Non-white | 0.080 | (1.115) | 0.074 | (0.836) |
| $\alpha_w$: | | | | |
| Education of Husband[2] | -0.211 | (0.681) | -0.244 | (0.650) |
| Education of Wife[2] | -0.979 | (1.223) | -1.078 | (0.478) |
| Age of Husband[2] | 0.019 | (0.712) | 0.066 | (0.407) |
| Age of Wife[2] | 0.022 | (0.753) | 0.071 | (0.500) |
| Number of Children[2] | -0.118 | (0.223) | -0.077 | (0.064) |
| Presence of Children <6 | 0.407 | (0.079) | 0.446 | (0.170) |
| Non-white | -0.429 | (0.816) | -0.390 | (0.288) |
| Unobserved Heterogeneity, Husband: | | | | |
| $\theta_{h1}$ | -2.243 | (0.070) | -2.208 | (0.067) |
| $\theta_{h2}$ | -1.942 | (6.121) | -1.974 | (8.032) |
| $\theta_{h3}$ | 1.836 | (0.906) | 1.610 | (0.878) |
| $\theta_{h4}$ | 1.672 | (0.016) | 1.640 | (0.587) |
| Unobserved Heterogeneity, Wife: | | | | |
| $\theta_{w1}$ | -2.479 | (0.188) | -2.444 | (0.096) |
| $\theta_{w2}$ | 2.204 | (0.934) | 2.341 | (1.273) |
| $\theta_{w3}$ | -1.360 | (0.238) | -1.533 | (0.234) |
| $\theta_{w4}$ | 0.963 | (0.314) | 0.986 | (0.626) |

**Table 6.1**
**Results from Estimating Model of Welfare Participation and Family Labor Supply (Continued)**

| | Model 1 | | Model 2 | |
|---|---|---|---|---|
| | Estimate | Standard Error[1] | Estimate | Standard Error[1] |
| Probability of Unobserved Heterogeneity: | | | | |
| $\pi_1$ | 0.4335 | (0.0160) | 0.4370 | (0.0164) |
| $\pi_2$ | 0.4217 | (0.0161) | 0.4209 | (0.0165) |
| $\pi_3$ | 0.0542 | (0.0090) | 0.0502 | (0.0087) |
| $\pi_4$ | 0.0906 | (0.0127) | 0.0919 | (0.0120) |
| Utility Function Threshold Parameters: | | | | |
| $\gamma_h$ | 316.5 | (9.09) | 312.9 | (133.9) |
| $\gamma_w$ | 235.4 | (52.03) | 241.6 | (10.4) |
| $\gamma_c$ | -123.0 | (326.20) | -102.0 | (304.3) |
| Measurement Error in Hours Worked: | | | | |
| $\sigma_h$ | 0.234 | (0.0020) | 0.235 | (0.0020) |
| $\sigma_w$ | 0.515 | (0.0068) | 0.513 | (0.0067) |
| Heterogeneity in Preferences for Welfare Participation ($\phi$): | | | | |
| Constant | 0.0783 | (0.0194) | 0.0877 | (0.0329) |
| Education[3] | - | - | 0.0219 | (0.0280) |
| Age[3] | - | - | 0.0023 | (0.0094) |
| Number of Children[2] | - | - | -0.0004 | (0.0069) |
| Nonwhite | - | - | -0.0240 | (0.0181) |
| $\sigma_s$ | 0.0449 | (0.0113) | 0.0441 | (0.0166) |
| Log of Likelihood Function | -8304.552 | | -8301.960 | |
| Number of Observations | 1010 | | 1010 | |

[1]Standard errors were calculated using the matrix of outer partials of the likelihood function.
[2]Education, age, and number of children variables are normalized by the following formulas:
( education - 12 ) / 10,
( age - 35 ) / 10, and
( # of children - 2 ).
[3]Education and age of the principal earner is used and both are normalized as in note 2.

**Table 7.1**
**Simulation Results: Effect of Changes in Model Variables on Welfare Participation, Employment Rates and Hours Worked[1]**

| | | Policy Simulation: | | | |
|---|---|---|---|---|---|
| | Current Law Estimates | Increase G 20% | Decrease $t_A$ 20% | Eliminate Work Restriction | Increase $w_h$ and $w_w$ 20% |
| Probability of Welfare Participation | 0.0861 | 0.0981 | 0.0898 | 0.0885 | 0.0725 |
| Probability of Eligibility for Welfare | 0.1126 | 0.1317 | 0.1331 | 0.1512 | 0.0934 |
| **All Families:** | | | | | |
| Employment Rate | | | | | |
| Husband | 0.864 | 0.862 | 0.864 | 0.864 | 0.869 |
| Wife | 0.489 | 0.484 | 0.490 | 0.487 | 0.493 |
| Average Hours | | | | | |
| Husband | 137.0 | 136.5 | 136.8 | 137.2 | 137.7 |
| Wife | 76.8 | 76.1 | 76.7 | 76.6 | 77.4 |
| **On Welfare:** | | | | | |
| Employment Rate | | | | | |
| Husband | 0.078 | 0.118 | 0.105 | 0.103 | 0.050 |
| Wife | 0.051 | 0.065 | 0.082 | 0.050 | 0.039 |
| Average Hours | | | | | |
| Husband | 6.5 | 9.9 | 9.1 | 12.9 | 4.1 |
| Wife | 4.2 | 5.4 | 7.1 | 4.1 | 3.1 |
| **Off Welfare:** | | | | | |
| Employment Rate | | | | | |
| Husband | 0.938 | 0.943 | 0.939 | 0.938 | 0.933 |
| Wife | 0.530 | 0.530 | 0.530 | 0.529 | 0.529 |
| Average Hours | | | | | |
| Husband | 149.3 | 150.2 | 149.5 | 149.3 | 148.1 |
| Wife | 83.6 | 83.8 | 83.6 | 83.6 | 83.2 |

[1] 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 1 in Table 6.1.

Table 7.2
Estimated Work Disincentive Effects of AFDC-UP Program:
Employment Rates and Average Hours of Work by Welfare Participation Status[1]

| | Percent of Population | Average Hours Worked | | Employment Rates | | Average Disposable Income | Average Utility |
|---|---|---|---|---|---|---|---|
| | | Husband | Wife | Husband | Wife | | |
| Current Law | | | | | | | |
| On Welfare | 8.61% | 6.5 | 4.2 | 0.08 | 0.05 | $805 | 5.698 |
| All Eligible | 11.26 | 11.7 | 20.0 | 0.12 | 0.16 | 800 | 5.709 |
| Off Welfare | 91.39 | 149.3 | 83.6 | 0.94 | 0.53 | 1793 | 6.412 |
| All | 100.00% | 137.0 | 76.8 | 0.86 | 0.49 | $1707 | 6.351 |
| Program Eliminated | | | | | | | |
| On Welfare Under Current Law | 8.61% | 53.4 | 35.8 | 0.59 | 0.36 | $731 | 5.663 |
| Eligible Under Current Law | 9.06 | 38.9 | 46.6 | 0.46 | 0.42 | 688 | 5.680 |
| Off Welfare Under Current Law | 91.39 | 149.3 | 83.6 | 0.94 | 0.53 | 1793 | 6.412 |
| All | 100.00% | 141.0 | 79.5 | 0.91 | 0.52 | $1701 | 6.348 |

[1]The simulations are based on the estimates for Model 1 in Table 6.1.

## Appendix A
## Likelihood Function for Model of Labor Supply and Welfare Participation

The discrete model developed in Section 3 and specified empirically in Section 4 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 (3.5) 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,

$$\delta_{ij\ell} = \begin{cases} 1 & \text{if } h_h = h_{hi},\ h_w = h_{wj},\ \text{and } \delta_P = \ell \\ 0 & \text{otherwise} \end{cases} \qquad \text{for } i = 0,1,2,\ j = 0,1,2,\ \text{and } \ell = 0,1\ . \tag{A.1}$$

The variable $\delta_{001}$ 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 $C(h_{hi}, h_{wj}, \ell)$ be family consumption that results from evaluating the budget constraint (3.5) at the work-welfare state defined by $\delta_{ij\ell}=1$. Substituting this into the family utility function in (3.1) results in,

$$\bar{U}_{ij\ell} = U_{ij\ell} - \phi\,\ell \tag{A.2}$$

where $U_{ij\ell} = U(h_{hi}, h_{wj}, C(h_{hi}, h_{wj}, \ell))$ and the functional form for $U_{ij\ell}$ is given by (3.2). Note that $\bar{U}_{ij\ell}$ differs from $U_{ij\ell}$ only by the inclusion of the disutility of welfare participation term. The probability that a family chooses the state denoted by $\delta_{ij\ell}$ is given by

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

That is, the state defined by $\delta_{ij\ell}$ is chosen if it yields the highest utility among all welfare and non-welfare choices.

Consider the probability in (A.3) taking into account the stochastic disturbances in the model. First, ignore the stigma component $\phi$ 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,

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

Thus, to choose the non-welfare state $\delta_{ij0}$, the hours choice $(h_{hi},h_{wj})$ must yield the highest utility among <u>all</u> non-welfare states (e.g. $U_{ij0} = Max\,U_{i'j'0}$ ) and the disutility from welfare participation must be sufficiently high to ensure that $U_{ij0}$ is also greater than <u>all</u> feasible welfare states ( e.g. $\phi > Max\,U_{i'j'1}-U_{ij0}$).

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,

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

Thus, to choose the welfare state $\delta_{ij1}$, the hours choice $(h_{hi},h_{wj})$ must yield the highest utility among <u>all</u>

welfare states and the disutility of welfare participation must be sufficiently low to ensure that $U_{ij1}$ is greater than all non-welfare states. Note that when comparing all possible hours choices when on-welfare, the stigma term is irrelevant as it is equal to $\phi$ for all hours points. Using the normality assumption on $\phi$, 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,

$$
\begin{aligned}
l(H_h, H_w, \delta_P) \;=\; & \sum_{k=1}^{M} \pi_k \left\{ \prod_{\ell=0,1} \left[ Pr(\delta_{00\ell} = 1 \mid \theta_{hk},\theta_{wk}) \right]^{\delta_{P\ell}} \right\}^{(1-\delta_h)(1-\delta_w)} \\
* & \left\{ \prod_{\ell=0,1} \left[ \sum_{i\neq 0} \sum_{j\neq 0} Pr(\delta_{ij\ell} = 1 \mid \theta_{hk},\theta_{wk})\; g_{H_h}(H_h \mid h_{hi})\; g_{H_w}(H_w \mid h_{wj}) \right]^{\delta_{P\ell}} \right\}^{\delta_h \delta_w} \\
* & \left\{ \prod_{\ell=0,1} \left[ \sum_{i\neq 0} Pr(\delta_{i0\ell} = 1 \mid \theta_{hk},\theta_{wk})\; g_{H_h}(H_h \mid h_{hi}) \right]^{\delta_{P\ell}} \right\}^{\delta_h(1-\delta_w)} \\
* & \left\{ \prod_{\ell=0,1} \left[ \sum_{j\neq 0} Pr(\delta_{0j\ell} = 1 \mid \theta_{hk},\theta_{wk})\; g_{H_w}(H_w \mid h_{wj}) \right]^{\delta_{P\ell}} \right\}^{(1-\delta_h)\delta_w}
\end{aligned}
\qquad (A.6)
$$

where the indicator variables are defined by,

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

and probabilities $Pr(\delta_{ij\ell} = 1 \mid \theta_{hk},\theta_{wk})$, 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 $\delta_p$. Because of the discrete form for the unobserved heterogeneity in preferences for work, we sum over the $M$ values for $(\theta_{hk},\theta_{wk})$ instead of taking an integral as in the continuous case. 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 non-working wives, and the fourth branch applies to families with non-working husbands and working wives. Note that within each branch, separate probabilities enter for welfare recipients and non-welfare recipients.

**Table B.1**
**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) |
| 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 - Non Central City | 0.51 | (0.50) |
| Number of Children | 2.08 | (1.14) |
| Presence of Child Less than 6 | 0.58 | (0.49) |

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

**Table B.2**
**Estimates of Wage Equation for Husbands[1]**

| 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) | |
| $\sigma$ | | 0.462 |
| | | (0.015) |
| $\rho$ | | -0.795 |
| | | (0.055) |
| Likelihood Function | -817.547 | |
| Number of Observations | 1010 | |

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