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Abstract

This paper examines family welfare and labor force participation of families potentially eligible for the new Temporary Assistance for Needy Families (TANF) program in the Midwest region. High wage rates and low unemployment rates decrease the probability of welfare participation. For these low-wealth families, labor supply is shown to be highly responsive to the wage rate.

MIDWEST WELFARE PROGRAM AND LABOR FORCE PARTICIPATION

Introduction

The goals of the 1996 Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) are to increase the flexibility of states and to end entitlement to cash assistance. The challenge is “to end the dependence of needy parents on government benefits by promoting job preparation, work, and marriage.” Since its passage, welfare recipiency has declined across the nation. Some research indicates that these caseload declines are the result of federal waivers obtained prior to the welfare reform legislation (CEA 1997). America’s growing economy has been providing greater incentives for individuals to work. Studies indicate that some householders previously dependent on welfare have found employment (RUPRI). Other householders, however, with poor labor market skills, little work experience, or weak motivation are still not working and remain in poverty. Even some who find jobs are not necessarily lifted out of poverty. Furthermore, the outcomes differ across regions. Looking at recipiency on a region-by-region basis provides further evidence that economic growth has helped cut welfare rolls (Saving and Cox). While nationwide the number of welfare recipients has been declining, caseload reduction has occurred at different paces across and within U.S. regions. The analysis in this paper is focused on the Midwest region.

In the Midwest, the decline in recipients of Aid to Families with Dependent Children (AFDC)/Temporary Assistance for Needy Families (TANF) varies state to state. The decline from January 1993 to December 1999 ranges from 40.3 percent in Minnesota to 81.2 percent in Wisconsin in the Midwest region (U.S. Department of Health and Human Services).[1] The Midwest region had the lowest regional poverty rate (U.S. Census Bureau 1999b). In 1996, 10.7 percent of people residing in the Midwest were poor, compared to 9.8 percent by 1999. In 1996, of the U.S. population living in poverty, 18 percent are located in the Midwest. The Midwest region also had the lowest unemployment rate: 4.5

percent and 3.6 percent, respectively, for 1996 and 1999. The median household income in the Midwest continued to surpass the 1989 inflation-adjusted income peak by 10.8 percent and reached a new all-time high in 1999 of $42,720 (U.S. Census Bureau 1999a).

The objective of this research is to examine the effects of the reformed welfare program on labor force participation and supply decisions. This study tests the effects of cash transfers on labor supply and welfare participation decisions and attempts to improve our general understanding of welfare and labor market activity of poor people.

Considerable literature exists on the effects of U.S. transfer programs on labor supply. Moffitt (1992) reviews the research on the effects of the welfare system on work incentives, welfare dependency, family structure, and migration. He first proposes that many eligible individuals and households do not participate because of the welfare stigma or their disutility of welfare participation (Moffitt 1983). Results of recent research show that eligibility and benefit structure have significant effects on labor and welfare participation. Keane and Moffitt used a structural model to examine work and multiple-welfare program participation decisions among single-adult female families. They used the estimated parameters to conduct policy simulations such as changing the benefits, wage subsidies, and a minimum wage and found that changes in wage rates have a larger effect on decisions than changes in the benefit. Hoynes modeled the effects of cash transfers on labor supply and welfare participation between two-parent families.

A number of recent studies have examined changes in welfare caseloads in the period before 1996 (Blank; CEA 1997; Wallace and Blank; Moffitt 1999) using aggregate state-level data.

To date, there is relatively little evidence on how well the goals of the new welfare-reform changes are being met. The studies reviewed above used pre-1996 data and analyzed changes that occurred before national welfare reform. Only a few recent studies have examined the effects of the 1996 reform on post-1996 caseloads. These include the 1999 CEA report and Schoeni and Blank. Evaluations of the effectiveness of welfare reforms on the number of people receiving welfare provide no information on what is happening to the well-being of families who leave welfare or never enter the program.

Many researchers have analyzed the effects of government transfer programs on labor supply behavior among the low-income population. Most of the empirical studies have provided insights on how welfare transfers affect labor supply decisions of low-income families and most focused solely on females (Keane and Moffitt) or solely on married couples (Hoynes). Although female-headed families represent most welfare recipients, the new welfare reform encourages holding jobs and marriage.

This study uses data from the Survey of Income and Program Participation (SIPP) to analyze labor market and welfare program participation decisions among all low-wealth families in the Midwest region. A static model of family behavior is developed where work and program participation is chosen to maximize family utility given a resource constraint. The model is used to explain the joint decisions to participate in TANF (which replaced AFDC) and the labor market for the population of families eligible for TANF. The paper presents estimates from a reduced-form and structural bivariate-probit model of participation in the labor force and TANF program and of a labor supply equation for working family members that do not participate in the welfare program.

TANF Program Eligibility

The PRWORA gives the states a fundamental role in assisting poor families. Under TANF, the eligibility rules and benefits are different across states. Eligible TANF families must have sufficiently low income and asset levels. The income test requires that net family income not exceed a maximum benefit level that varies by family size and state of residence. Net income includes unearned income as well as countable earned income. Countable earned income includes earned income less an earned income disregard and a childcare deduction. The families eligible for TANF are also eligible for food stamp and Medicaid programs.

With TANF participation comes benefits. A family with no income is eligible to receive the maximum TANF grant or pay standard. For a family with income, the TANF benefits to be transferred are calculated as the difference between the maximum benefit and net family income. Net family income includes all unearned income plus countable earned income. Each state determines its own benefit level, which varies with family size. The TANF benefits are calculated according to the following formula:

$$B_T = \min \{P, G_T\text{-}[N + (wH - E)*BRR - CC]\}$$

$$CC = \min [200, CD] \text{ if child} <= 2 \text{ yrs}$$

$$CC = \min [175, CD] \text{ if child} > 2 \text{ yrs},$$

where B_T is the monthly TANF benefit, P is the maximum permitted payment in the state, G_T is the maximum amount paid, L is living costs, N is unearned income, w is the wage, H is hours of work, CC is child care deductions, CD is child care expenses, E is the earnings disregard, and BRR is the benefit reduction rate, which is applied to earnings that exceed the income disregard. P and G_T vary with the family size in each state. P, G_T, L, E, and BRR vary by state and family size.

The PRWORA added significant new work requirements for welfare recipients. Under welfare reform, single-parent families receiving TANF benefits were required to work at least 20 hours per week by 1997; the requirement was increased to 30 hours per week by 2000. For two-parent families, the work requirement is 35 hours per week, and the parents can share the work hours. This requirement tends to force families into the workplace and off welfare.

Theoretical Model

The model presented below is a model in which the family chooses whether to work or not and simultaneously decides whether to participate in TANF and the labor force. Participation in labor force and TANF are endogenous. The TANF participation and labor supply decisions are interdependent because labor supply decisions depend on TANF benefits (through their effect on the budget constraint), and the TANF participation decision depends on labor supply (through its effect on the TANF benefits). Therefore, the program participation and labor force combination of choices must be treated jointly, and the labor participation equation must be estimated jointly with the TANF participation equation.

Participation in welfare programs is not costless. There are costs associated with a family filing an application, going for interviews, as well as the opportunity cost from reduced expected future benefits due to a lifetime time limit imposed in TANF. In addition, Moffitt (1983) suggested that a stigma is associated with AFDC participation and this helps explain the observed lower-than-expected participation rates. Families facing relatively low costs of current period participation are more likely to participate than those facing higher costs. How these costs affect the family decision to participate in TANF depends on when they want to receive the cash income support from TANF now or possibly in the future and on the expected duration of need for benefits.

Given the freedom that states have in designing TANF programs, important and hard-to-measure differences exist that might affect labor supply and TANF decisions. For example, the way in which the state TANF bureaucracy encourages or discourages participation in the state's TANF programs is likely to affect stigma and transaction costs of participating and therefore account for many of the exits and new entries into TANF. But this is difficult to measure. While both ignorance and the costs/stigma associated with claiming may be important, the empirical analysis here cannot directly address the former since the data do not cover individual attitudes toward and information about benefits. The empirical analysis of the impact of ignorance/costs is difficult to prove with any data, but one can only address this interesting issue indirectly to the extent that individual characteristics may be correlated with these factors.

To model decisions on labor force and program participation, I follow Moffitt (1983) and assume the family utility function is separable:[2]

$$U(L, X, P_t) = U(L, X) + \delta P_t \qquad (1)$$

where L is adult family effective leisure, X is purchased goods, P_t is an indicator equal to 1 if the individual participates in TANF and 0 if not, δ is the marginal disutility of TANF participation, $\bar{T}$ (= L + H) is the adult family time endowment, and H is family labor supply. Define time in "effective" terms so it can be aggregated across the family head and a spouse for the married-couple families:

$$\bar{T} = \bar{T}_f + \bar{T}_m e^{\gamma}$$

$$\bar{T} = L_f + H_f + (L_m + H_m)e^{\gamma}$$

where $\bar{T}_j$ is time endowment of j = f(female spouse) or m(male spouse), and γ is an efficiency factor. The adult family effective leisure L and the adult family effective labor supply H are

$$L = L_f + L_m e^{\gamma}$$

$$H = H_f + H_m e^{\gamma} \quad (2)$$

The presence of the program participation indicator in equation (1) represents the costs of participating in the welfare program and is included to explain and account for nonparticipation among eligible families. If there is stigma associated with program participation, then $\delta<0$. The expectation is $\partial U/\partial H < 0$, $\partial U/\partial Y > 0$, $\partial U/\partial P_t<0$.
The budget constraint gives monthly disposable income:

$$I = wH + N + P_t(B(H)\text{-}C) = P_xX, \quad (3)$$

where w is the hourly wage rate per effective hour (in adult female units), N is unearned income, B(H) is the benefit function for TANF, and C is the monetary cost associated with TANF participation. The full income is

$$w(\bar{T} - L) + N + P_t(B(H)\text{-}C) - P_xX = 0 \text{ or}$$

$$F = w\bar{T} + N + P_t(B(H)\text{-}C) = P_xX + wL.$$

The family is assumed to choose H (or L) and P_t simultaneously to maximize its utility U (L, X, P_t) subject to the budget constraint in (3). The optimal choices are

$$X^{*}= d_X[w, P_x, N, B'(H), C],$$

$$L^{*}= d_L[w, P_x, N, B'(H), C],$$

$$H^{*}= \bar{T} - L^{*}=S_H[w, P_x, N, B'(H), C],$$

$$P_t^{*} = d_{Pt}[w, P_x, N, B'(H), C].$$

Empirical Specification and Estimation

The resulting choice set has four alternatives, each of which is a combination of the labor supply (work/not work) and TANF (participate/not participate) status. Each alternative provides a particular level of indirect utility V_{sm}. The subscripts *s* and *m* combined denote an alternative, which is a combination of labor force and the TANF participation decision. The family chooses the alternative *sm* such that $V_{sm} \geq V_{s'm'}$ for all $s'm' \neq sm$.

Econometrically I assume that the utility function contains known measured variables and a random parameter that represents unobserved heterogeneity of preferences. The indirect utility function V_{sm} of family *i* is

$$V_{ism} = x_i'\,\theta_{sm} + z_{ism}'\,\gamma_{sm} + \varepsilon_{ism}, \tag{4}$$

where x_i is a vector of individual characteristics, z_{ism} is a vector of alternative-specific attributes, and ε_{ism} is the alternative-specific disturbance from choice *sm*. Attributes of the family head are used to proxy tastes for work and welfare participation and include head's age, education, marital status, number of children, etc. This set of variables includes a proxy for the unmeasured utility costs associated with welfare participation. Having children age 6 or less and the local (state) unemployment rate may proxy the family expectation of need of benefit. I assume that the higher unemployment rates would reduce the stigma of participation. The unemployment rate is positively correlated with the length of time over which the family discounts the monetary costs of participation. The choice-specific variables include benefit from TANF. The stochastic component captures the effect of unobserved heterogeneity of preferences.

Given the form of the utility function and the probability distribution of the stochastic component, the probability that the family chooses alternative *sm* is written as $Prob_{ism} = Prob[V_{ism} \geq V_{is'm'}$ for all $is'm' \neq ism]$.

Several random utility models exist, having different assumptions about the stochastic component. Maddala presents an extensive discussion of limited-dependent and qualitative-variable models in econometrics. The most widely used model in the discrete choice literature is the multinomial logit model that can be easily estimated for large choice sets. However, the multinomial logit model assumes that the stochastic errors are uncorrelated across alternatives. In the choice set used here, the unobserved error terms are not independent, and they are likely to be correlated. The multinomial probit model allows the error terms to be correlated across all alternatives in the choice set. Therefore, ε_{ism} are normally distributed with standard deviations SDV $[\varepsilon_{ism}]=\sigma(i)$ and unrestricted correlations COR $[\varepsilon_{ism}, \varepsilon_{is'm'}]=\rho(sm, s'm')$.

To accommodate the complex structure of the decision making, I use a switching-regression-model technique, corrected for selectivity bias, to examine TANF participation and labor force participation. Decisions regarding membership in one or another regime are the result of a family's optimizing behavior. The families can be divided into four regimes:

1. Those participating in labor market and TANF.
2. Those participating in labor market but not in TANF.
3. Those participating in TANF but not in labor market.
4. Those not participating in either labor market or TANF.

Thus, four alternative regimes are identified based on outcomes of the discrete choices of participation in labor market and TANF. Endogenous switching among the four regimes can occur when the individuals are not randomly assigned to each regime (Maddala; Huffman). Jensen and Manrique used the endogenous switching technique to estimate demand for the low-income group, which had a large number of zeroes for some food groups.

Define P_l and P_t as participation in the labor force and TANF, respectively. All the families are then classified into four mutually exclusive regimes based on the discrete choice outcome on P_l and P_t:

$$R_1: P_l = P_t = 1,$$

$$R_2: P_l = 1 \text{ and } P_t = 0,$$

R_3: $P_l = 0$ and $P_t = 1$, and

R_4: $P_l = P_t = 0$.

All observations have a non-zero probability of being assigned to one of the four regimes. This probability can be evaluated using the following bivariate probability statements:

$$M_{11} \equiv P(R_1)=P(P_l,P_t = 1)=P[P_l^*=\theta_l'Z_l+\mu_l>0,\ P_t^*=\theta_t'Z_t+\mu_t>0], \quad (5)$$

$$M_{10} \equiv P(R_2)=P(P_l=1,\ P_t=0)=P[P_l^*=\theta_l'Z_l+\mu_l>0,\ P_t^*=\theta_t'Z_t+\mu_t\leq 0], \quad (6)$$

$$M_{01} \equiv P(R_3)=P(P_l=0,\ P_t=1)=P[P_t^*=\theta_t'Z_t+\mu_t>0,\ P_l^*=\theta_l'Z_l+\mu_l\leq 0], \quad (7)$$

$$M_{00} \equiv P(R_4)=P(P_l,P_t=0)=P[P_l^*=\theta_l'Z_l+\mu_l\leq 0,\ P_t^*=\theta_t'Z_t+\mu_t\leq 0]. \quad (8)$$

Although P_l^* and P_t^* are unobservable variables, one does observe the dummy variables P_l and P_t such that $P_l = 1$ if $P_l^* > 0$ and $P_l = 0$ otherwise, $P_t = 1$ if $P_t^* > 0$ and $P_t = 0$ otherwise. Define Z_l and Z_t as vectors of exogenous variables, θ_l and θ_t as parameter vectors, and μ_l and μ_t as disturbance terms. Maximum-likelihood estimates of bivariate-probit regressions are used to estimate θ_l and θ_t. These estimates give the probabilities (5) through (8).

Estimating the labor supply equation for regime 2 without taking account of the probability of selection will potentially produce biased and inconsistent estimates. Probabilities 5-8 are therefore used to construct estimates of selection terms for the labor supply equation and to correct the labor supply equation for self-selectivity bias for regime 2.

Two-step estimation is used here. First, I jointly estimate the reduced-form labor force and welfare program participation equations by maximum-likelihood method and then calculate the self-selection variables. Second, I estimate the labor supply including two self-selection variables for families who work and do not participate in the welfare program.

The general specification for the bivariate probit model is

$$P_l^* = \theta_l' Z_l + \mu_l,\ P_l = 1 \text{ if } P_l^* > 0, \text{ and 0 otherwise},$$

$$P_t^* = \theta_t' Z_t + \mu_t,\ P_t = 1 \text{ if } P_t^* > 0 \text{ and 0 otherwise},$$

$$E[\mu_l] = E[\mu_t] = 0,\ var[\mu_l] = var[\mu_t] = 1,\ cov[\mu_l, \mu_t] = \rho.$$

The bivariate normal cumulative density function is

$$prob(Z_l < z_l, Z_t < z_t) = \int_{-\infty}^{z_l}\int_{-\infty}^{z_t} \phi(Z_l, Z_t, \rho) dZ_l dZ_t = \Phi(Z_l, Z_t, \rho),$$

where $\phi(Z_l, Z_t, \rho)$ is the bivariate normal density function. The probabilities that enter the likelihood function are

$$M_1 = \Phi(\theta_l Z_l,\ \theta_t Z_t,\ \rho),$$

$$M_2 = \Phi(\theta_l Z_l,\ -\theta_t Z_t,\ -\rho),$$

$$M_3 = \Phi(-\theta_l Z_l,\ \theta_t Z_t,\ -\rho),$$

$$M_4 = \Phi(-\theta_l Z_l,\ -\theta_t Z_t,\ \rho).$$

Then, the log-likelihood function for the bivariate-probit model is $\ln L = \sum_{i=1}^{n}\sum_{j=1}^{4} \ln M_{ij}$.

The following labor supply equation is proposed for regime 2 (work and does not participate in welfare):

$$\ln(hours) = \gamma_0 + \gamma_1 age + \gamma_2 agesq + \gamma_3 \ln(\hat{wage}) + \gamma_4 M' + \gamma_5 otherinc + \mu_H, \tag{9}$$

where ln(hours) is the natural log of hours of work in female units as defined in (2);[3] age = $(age_f + age_m)/2$, age_f or age_m, $\ln(\hat{wage})$ is the predicted female wage; M′ is a vector of exogenous variables including gender, number of children age 6 and under, number of children between ages 6 and 12, number of children between ages 13 and 18, marital status, and local unemployment rate; otherinc is the family nonlabor income (exclusive of transfers), and μ_H is a normal random error term. To correct the labor supply equation for self-selectivity bias for a family in regime 2, I include two selection variables.

The empirical specification of the individual human-capital-based wage equation is

$$ln(\text{wage}) = \beta_0 + \beta_1\text{age}+\beta_2\text{agesq}+\beta_3\text{edu}+\beta_4\text{male}+\beta_5 O'+\mu_w, \quad (10)$$

where O' is a vector of exogenous variables including race (white=1), marital status (married=1), male=1 if there is an adult male in the family, metro/nonmetro location (metro=1), and labor market variables (state unemployment rate); and μ_w is a normal random error term. The wage equation also includes a labor market selection variable.

Data and Variables

The midwestern state subsets of the 1996 SIPP Panel provide the region-specific family-level data for analysis. The advantage of using the SIPP is that the SIPP contains detailed information about the characteristics of, and actual choices made by, both participants and non-participants whereas the administrative record data contains information only on participants. In 1996, considerable variation existed across the Midwest states in eligibility rules (including some states, such as Iowa, which offer waivers). The SIPP provides information on the economic, demographic, and social situations of family members. SIPP's monthly data provide a significant advantage over annual data sets for the study of TANF and other welfare programs. The model is estimated using data from SIPP 1996, wave 3.

Only families with nonelderly (between ages 18 and 65), nondisabled household heads and/or spouses are included in the sample (both elderly and the disabled are eligible for other transfer programs). Families are also excluded if they are categorically ineligible for the TANF program, that is, if they do not have a child under age 18 in the family. For the decision on TANF and labor force participation, family assets are predetermined. Therefore, families with assets that exceed $6,000, the highest asset limit of TANF, are excluded from the sample (Table 1). I do not screen families for income level because hours of work and hence income are endogenous variables, and the family

TABLE 1. TANF asset limits

	Asset Limits ($)	Vehicle Exemption	Implementation
Illinois	$3,000	One vehicle	After 8/96
Indiana	Recipient: $1,500 Applicant: $1,000	$1,000	1/92-8/96
Iowa	Recipient: $5,000 Applicant: $2,000	$3,889[a]	1/92-8/96
Kansas	$2,000	One vehicle	After 8/96
Michigan	$3,000 (countable cash assets only)	One vehicle[b]	After 8/96
Minnesota	$5,000[c]	$7,800[d]	After 8/96
Missouri	Recipient: $5,000[e] Applicant: $2,000	One vehicle; plus $1,500 of second	1/92-8/96
Nebraska	$4,000/$6,000[f]	One vehicle	After 8/96
Ohio	$1,000	$4,650	Before 1/92
Wisconsin	$2,500	$10,000	1/92-8/96

Source: Gallagher et al.
[a]The value of one vehicle up to $3,889 for each adult and working teenage child is exempt.
[b]The value of up to two vehicles if "necessary as a condition of employment" was exempt.
[c]The asset limit is effective 1/1/98. Prior to 1/1/98 the asset limit is $1,000.
[d]The vehicle exemption is effective 1/1/98. Prior to 1/1/98 the vehicle exemption was $4,650.
[e]This is the asset limit for families with a self-sufficiency agreement.
[f]The asset limit is $4,000 for a single individual and $6,000 for two or more individuals.

members' decision to earn an amount that causes family income to exceed the family break-even level is a matter of choice. The resulting Midwest sample includes 1,837 families with low wealth who live in the Midwest region, 64 percent of whom are married-couple families, and 77 percent of whom live in metro areas.

All the dependent variables are defined for the month of November 1996. A family is recorded as a TANF participant if a member reports receiving TANF support in the month. For labor supply and single family, the participant is classified as not working if he or she reports working zero hours during the month, and as working if the participant reports working one or more hours per week during the month. For married-couple families, the family is classified as not working if the family head and spouse report working zero combined hours during the month, and as working if the family head and spouse report working a total of one or more hours per week during the month.

Variables used in this analysis include a set of demographic variables, a set of family-composition variables, and a set of structural variables designed to capture differences in labor market conditions and transfer programs. The demographic variables for the family head include gender, age, education level, and a dichotomous variable indicating race (white=1) for single family. For a married couple the demographic variables are the average age and average schooling as defined earlier. The set of family-composition variables includes the number of children under age 6, number of children between ages 6 and 12, and number of children between ages 13 and 18. The set of individual characteristics includes METRO, a 1-0 dichotomous variable that indicates that the family lives in a metro area versus a nonmetro area; and UNRATE, the state's monthly unemployment rate. Also, relevant are the observations of actual family earned and unearned income, program participation choices, and actual benefit levels and assets.

Table 2 displays the means and standard deviations of variables and Table 3 shows the distribution of the dependent variables—labor and welfare program participation. About 10 percent of the asset-eligible families receive TANF, and 89 percent participate in labor market. Table 3 shows that the workers are concentrated in the TANF nonparticipation cell—84 percent of the Midwest sample—while 6 percent of the sample do not work and do not participate in TANF; 5 percent do not work but participate in TANF, and 5 percent work and participate in TANF. The participation rate is much higher for the single families (22 percent) compare to the married-couple families (4 percent) while the married couples work more (95 percent) then the single families (77 percent).

Empirical Results

Reduced-Form Bivariate-Probit Model of Participation in the Labor Market and TANF Program

The dependent variables of the empirical model are labor force and welfare participation. Labor force and welfare participation are binary variables. The reduced form of the joint labor force and welfare participation is estimated. Table 4 presents estimated parameters for the bivariate-probit model of labor force and welfare

TABLE 2. Definitions, means, and standard deviations of variables (n=1,768)

Variable	Mean (Standard Deviations)	Definition
Age	35.97 (8.20)	Age of family head if single head family, and average of age of family head and spouse if married couple family
Agesq	1361.2 (625.2)	Age squared
Schooling	12.72 (2.33)	Years of schooling of family head if single family; average of years of schooling of family head and spouse if married couple family
Male	0.70 (0.46)	Dichotomous variable equal to 1 if male adult is present in a family, and 0 otherwise
Married	0.64 (0.48)	Dichotomous variable equal to 1 if married couple family, and 0 otherwise
White	0.81 (0.39)	Dichotomous variable equal to 1 if family head is white, and 0 otherwise
Metro	0.77 (0.42)	Dichotomous variable equal to 1 if a family lives in metro area, and 0 otherwise
Kids6	0.70 (0.84)	Number of children who are younger than 6 years old in family
Kids13	0.82 (0.91)	Number of children who are 6 and younger than 13 years old in family
Kids18	0.52 (0.72)	Number of children who are 13 and younger than 18 years old in family
D1*	0.21 (0.41)	Dichotomous variable equal to 1 if family lives in state Illinois, and 0 otherwise
D2	0.11 (0.31)	Dichotomous variable equal to 1 if family lives in state Indiana, and 0 otherwise
D3	0.04 (0.20)	Dichotomous variable equal to 1 if family lives in state Iowa, and 0 otherwise
D4	0.04 (0.19)	Dichotomous variable equal to 1 if family lives in state Kansas, and 0 otherwise
D5	0.13 (0.34)	Dichotomous variable equal to 1 if family lives in state Michigan, and 0 otherwise
D6	0.09 (0.28)	Dichotomous variable equal to 1 if family lives in state Minnesota, and 0 otherwise
D7	0.11 (0.31)	Dichotomous variable equal to 1 if family lives in state Missouri, and 0 otherwise
D8	0.03 (0.16)	Dichotomous variable equal to 1 if family lives in state Nebraska, and 0 otherwise

TABLE 2. (continued)

Variable	Mean (Standard Deviations)	Definition
D9	0.18 (0.38)	Dichotomous variable equal to 1 if family lives in state Ohio, and 0 otherwise
UNRATE	4.36 (0.70)	State Unemployment Rate
Nonlabor income	158.09 (409.32)	Family non labor income exclusive of welfare transfers per month in $
Pay Standard	450 (136.22)	Maximum TANF grant per month in $ given participation
ln(hours)	4.10 (0.57)	Natural log of hours worked last week by family head if single, or effective hours of work if married couple family
ln(wage)	6.86 (0.43)	Natural log of hourly wage (cents)
ln ($\hat{wage}$)	6.66 (0.17)	Predicted value of natural log of hourly wage (cents)
LF participation	0.89 (0.32)	Dichotomous variable equal to 1 if family head works if single, and family head and/or spouse work if married, and 0 otherwise
TANF participation	0.10(0.30)	Dichotomous variable equal to 1 if a family participates in TANF, and 0 otherwise

Note: * The reference state is Wisconsin (mean is 0.06; standard deviation is 0.25).

TABLE 3. Distribution of the Midwest sample by labor supply and welfare participation

	Work		Not work		All	
			All Family Types			
Not participate in TANF	1,533	84%	115	6%	1,648	90%
Participate in TANF	95	5%	94	5%	189	10%
All	1,563	89%	209	11%	1,837	100%
			Single Family			
Not participate in TANF	456	68%	64	10%	520	78%
Participate in TANF	62	9%	85	13%	147	22%
All	518	77%	149	23%	667	100%
			Married-Couple Family			
Not participate in TANF	1,077	92%	51	4%	1,128	96%
Participate in TANF	33	3%	9	1%	42	4%
All	1,110	95%	60	5%	1,170	100%

Source: SIPP 1996, wave 3.

TABLE 4. Estimated parameters for the reduced-form bivariate-probit model of family labor force and welfare participation in the Midwest region

Variables	LF Participation	TANF Participation
Intercept	-1.09 (0.676)	2.96 (0.83)**
Age	0.066 (0.034)**	-0.14 (0.04)**
Agesq	-0.001 (0.0004)**	0.002 (0.0005)**
Schooling	0.091 (.02)**	-0.12 (0.023)**
Male	0.022 (0.174)**	-1.25 (0.37)**
Married	0.56 (0.173)**	0.23 (0.37)
White	0.232 (0.111)**	-0.59 (0.12)**
Kids6	-0.253 (0.058)**	0.32 (0.063)**
Kids13	-0.052 (0.052)	0.15 (0.06)**
Kids18	-0.061 (0.068)	0.05 (0.07)
Nonlabor income	-0.0002 (0.00008)**	-0.0005 (0.0002)**
D1	-0.30 (0.21)	0.33 (0.31)
D2	0.01 (0.24)	-0.02 (0.35)
D3	0.23 (0.32)	0.25 (0.39)
D4	-0.01 (0.29)	0.12 (0.40)
D5	-0.06 (0.22)	0.60 (0.31)*
D6	-0.27 (0.24)	0.45 (0.35)
D7	-0.26 (0.22)	-0.02 (0.34)
D8	0.29 (1.82)	0.07 (2.07)
D9	-0.03 (0.21)	0.18 (0.32)
Rho (correlation coefficient)	-0.563 (0.061)**	
Log likelihood function	-914.37	

Note: * Denotes statistically significant at the 10 percent level. ** Denotes statistically significant at the 5 percent level. The omitted state is Wisconsin.

participation. Variables that enter directly into the family budget constraint include the nonlabor income, which includes all nonwage family income excluding income from TANF, food stamp programs and other transfers. Nonlabor income has a statistically significant and negative effect on both welfare and labor force participation.

Several variables that capture differences in tastes and opportunities across families are also included. The signs of these coefficients suggest that a head having more years of education, being male, or being white all decrease the probability that a family participates in TANF for single families. For a married couple, more years of education and having a male in the family decrease the probability of welfare participation. Having more children under age 6 and between ages 6 and 13 increases the probability of welfare participation. All these coefficients are statistically significant. The effect of age is negative on the probability of TANF participation but it gets smaller in absolute value when a person gets older and approaches the length of his or her expected life. More educated, presumably more skilled, family heads are more likely to increase their labor participation and decrease their welfare participation. This suggests that they are able to replace their lost welfare benefits with earnings.

In the labor force participation equation, the coefficients on age, schooling, married, and white are positive. Having children under age 6 decreases the probability of labor participation. All the coefficients are significantly different from zero. State dummy variables are included in both equations. Most of the estimated coefficients are not significantly different from zero.

The cross-equation correlation between the two participation equations is large and negative (–0.563) and highly significant. This implies (*a*) that the random disturbances in labor force participation and TANF participation decisions are affected in the opposite direction by random shocks (from unmeasured effects), and (*b*) that the labor force participation and TANF participation decisions are not statistically independent.

Wage and Labor Supply Equations

The estimates of the wage equation are reported in Table 5. The wage equation is concave in age, and the effect peaks at age 47. Added schooling increases wage through increased labor productivity, holding other things equal. One additional year of schooling has the direct effect of increasing the wage by 4.9 percent. The findings on other variables are consistent with other studies. Being male increases the wage. Individuals living in metro areas received higher wage rates than those living in non-metro areas.

I estimated a wage equation for the family heads (single family) and spouse (married-couple family) that work and then used the predicted wage in the labor supply equation in place of the actual wage, an instrumental variable. Two estimates of the labor supply equation are reported in Table 6, one with and one without selection variables. The results are quite similar. Only the income effect is not significant in the labor supply equation without selection term. Most of the coefficients of the labor supply equation are consistent with the findings in the labor supply literature. Having a male in the family

TABLE 5. Estimates of the log wage equation

Explanatory Variables	Dependent Variable ln(wage)
Intercept	4.70 (0.25)**
Age	0.06 (0.009)**
Agesq	-0.0006 (0.0001)**
Schooling	0.050 (0.007)**
Married	-0.09 (0.053)*
Male	0.276 (0.06)**
White	0.050 (0.030)*
Metro	0.09 (0.02)**
D1	0.01 (0.04)
D2	-0.01 (0.05)
D3	0.02 (0.06)
D4	0.04 (0.06)
D5	-0.01 (0.05)
D6	0.03 (0.05)
D7	-0.03 (0.05)
D8	-0.04 (0.07)
D9	-0.04 (0.04)
Lambda	0.04 (0.11)
R-square	0.16
F Statistics	17.81
Number of observations	1,660

Notes: *Denotes statistically significant at the 10 percent level. **Denotes statistically significant at the 5 percent level. Standard errors are in parentheses. The omitted state is Wisconsin.

TABLE 6. IV estimates of the family labor supply equation

Explanatory Variable	Dependent Variable ln(hours)	
Intercept	2.90 (0.63)**	2.85 (0.57)**
Age	-0.039 (0.014)**	-0.038 (0.014)**
Agesq	0.0004 (0.0002)**	0.0004 (0.0002)**
UNRATE	-0.023 (0.017)	-0.023 (0.017)
Kids6	-0.079 (0.021)**	-0.079 (0.019)**
Kids13	-0.035 (0.015)**	-0.035 (0.015)**
Kids18	0.044 (0.02)**	0.043 (0.02)**
Male	0.13 (0.064)**	0.134 (0.055)**
Married	0.51 (0.052)**	0.51 (0.051)**
ln(*wâge*)	0.276 (0.11)**	0.281 (0.10)**
Nonlabor income	-0.00007 (0.00004)*	-0.00005 (0.00003)**
Lambda1	0.007 (0.009)	
Lambda2	-0.015 (0.099)	
R-square	0.264	0.263
F Statistics	45.34	54.39
Number of observations	1,533	1,533

Notes: * Denotes statistically significant at the 10 percent level. **Denotes statistically significant at the 5 percent level. Standard errors are in parentheses.

and being a married family increases labor supply. The labor supply response to an increase in wage is positive and statistically significant. The effect of nonlabor income on labor supply is negative and relatively small, e.g., a thousand dollar increase in non-wage income reduces hours worked by 0.07 percent. Families with young children work fewer hours. One additional child under age 6 or between ages 6 and 12 decreases hours of work by 8 and 4 percent respectively, while one additional child between ages 13 and 18 increases hours of work by 4.4 percent. Labor supply is highly responsive to the wage. The wage elasticity is 0.276 and the income elasticity is –0.01.

Structural Form of the Bivariate-Probit Model of Participation in the Labor Market and TANF Program

In the structural labor force and welfare participation equation the predicted wage and the TANF pay standard (the projected TANF benefit) are included as regressors. Table 7 presents estimated parameters. Nonlabor income, the welfare benefits, and the predicted wage are the variables, which enter directly into the family budget constraint. Nonlabor income has a statistically significant and negative effect on both welfare and labor force participation. As expected, the pay standard, which is a proxy for the TANF benefits, has a positive effect on TANF participation and a negative effect on labor force participation, and it is statistically significant. The coefficient of predicted wage is negative in the TANF participation equation and positive in the labor force participation equation. The coefficients are statistically different than zero.

The cross-equation correlation between the two participation equations is large and negative (–0.563) and highly significant. Other results are somewhat similar to those for the reduced-form equations.

Table 8 shows the marginal effects on the probability of TANF, and labor force participation is evaluated for the structural participation equations. For TANF participating families, a 10 percent increase in the wage increases the probability of labor force participation by 7 percent and a $100 increase in the pay standard decreases the probability of labor force participation by 1 percent. A one-percentage-point change (increase) in the unemployment rate decreases the labor force participation probability by

TABLE 7. Estimated parameters for the structural bivariate-probit model of family labor force and welfare participation in the Midwest region

Variables	LF Participation	TANF Participation
Intercept	-8.18 (2.07)**	8.63 (2.38)**
Age	-0.018 (0.042)	-0.05 (0.046)
Agesq	-0.0001 (0.0005)	0.0009 (0.0006)
Male	0.26 (0.17)	-1.28 (0.307)**
Married	0.70 (0.18)**	-0.139 (0.31)
Kids6	-0.25 (0.07)**	0.242 (0.073)**
Kids13	-0.049 (0.057)	0.053 (0.07)
Kids18	-0.064 (0.072)	-0.03 (0.08)
Nonlabor income	-0.0002 (0.00008)**	-0.0006 (0.0001)**
UNRATE	-0.14 (0.07)*	0.27 (0.082)**
ln(*wâge*)	1.61 (0.37)**	-1.61 (0.43)**
Pay standard	-0.0002(0.0004)	0.002 (0.0004)**
Rho (correlation coefficient)	-0.563 (0.06)**	
Log likelihood function	-938.94	

Notes: *Denotes statistically significant at the 10 percent level. **Denotes statistically significant at the 5 percent level. Standard errors are in parentheses.

TABLE 8. Marginal effects from the structural bivariate-probit model

	Probability of family LF participation given:		Probability of TANF participation given:	
Variable	Participating in TANF	Not Participating in TANF	Family Working	Family Not Working
Intercept	-3.6758	-1.1142	0.7198	3.1598
Age	-0.0082	-0.0025	-0.0041	-0.0182
Agesq	0.0000	0.0000	0.0001	0.0003
Married	0.3163	0.0956	-0.0116	-0.0509
Male	0.1159	0.0351	-0.1071	-0.4703
Kids6	-0.1142	-0.0346	0.0202	0.0886
Kids13	-0.0222	-0.0067	0.0045	0.0196
Kids18	-0.0287	-0.0087	-0.0027	-0.0119
Nonlabor income	-0.0001	-0.00003	0.0000	-0.0002
UNRATE	-0.0628	-0.0191	0.0223	0.0978
ln(*wâge*)	0.7272	0.2189	-0.1345	-0.5903
Pay standard	-0.0001	-0.00002	0.0001	0.0007

6 percent. An increase in nonlabor income by $1,000 decreases the labor force participation probability by 10 percent. Being a married family and having a male in the family increases the probability of labor force participation by 32 and 12 percent respectively. Having one additional child age under age 6, between ages 6 and 12, or between ages 13 and 18 decreases the probability of working by 11, 2, and 3 percent respectively.

For TANF nonparticipating families, a 10 percent increase in the wage increases the probability of working by 2 percent, and a $100 increase in the pay standard decreases the probability of labor force participation by 1 percent. Being a married family and having a male in the family increase the probability of working by 10 and 4 percent respectively. Given nonparticipation in TANF, the marginal effects are of a smaller magnitude in absolute values.

However, a 10 percent increase in the wage decreases the probability of participation in TANF by 1 and 6 percent for working or nonworking families, respectively. A $100 increase in the pay standard increases the probability of welfare participation by 1 or 7 percent given working or not working, respectively. A one-percentage-point increase in the unemployment rate increases the probability of TANF participation by 2 or 10 percent for working or nonworking families, respectively. The marginal effects in absolute value are bigger given the case of a nonworking family. Being a married family and having a male in the family decreases the welfare participation probability by 1 and 11 percent respectively given the case of a working family. Being a married family and having a male in the family decreases the welfare participation probability by 5 and 47 percent respectively given the case of a nonworking family. A thousand dollar increase in the nonlabor income decreases the probability of TANF participation by 20 percent given the case of a nonworking family. Having one additional child under age 6 or between ages 6 and 12 increases the probability of TANF participation by 2 and 0.5 percent, while having one additional child between ages 13 and 18 decreases the probability of welfare participation by 0.3 percent for working families. Having one additional child under age 6 or between ages 6 and 12 increases the probability of TANF participation by 9 and 2 percent, while having one additional child between ages 13 and 18 decreases the probability of welfare participation by 1 percent for nonworking families.

Conclusions

This study analyzes the welfare program and labor force participation choices made by low-wealth families in the Midwest and the effects of the reformed welfare program on the labor force participation and supply decision. This paper points to factors that contribute to achieving family welfare independence. These factors include education, family structure, and benefits, as well as labor market conditions (wage and employment opportunities).

Both a reduced-form and structural bivariate-probit model of participation in the labor force and TANF program were estimated. The findings of the paper demonstrate that families having preschool children have high probability of welfare participation, while more educated and married families have low probability of TANF participation. A 10 percent increase in the (predicted) wage increases the probability of wage work for TANF participating families by 7 percent and only by 2 percent for TANF nonparticipating families, while a $100 increase in TANF benefit decreases labor force participation by 1 percent given TANF participation or TANF nonparticipation. A 10 percent increase in the wage decreases the probability of TANF participation by 1 percent for a working family and by 6 percent for a nonworking family, while a $100 increase in TANF benefits increases the probability of TANF participation by 7 percent for a nonworking family and by 1 percent for a working family.

An endogenous switching-regression-model technique yielded unbiased and consistent labor supply parameters for the low-wealth family heads that work but do not participate in the welfare program. The wage elasticity is larger than those individual elasticities reported in recent studies. Labor supply is highly responsive to the wage rate in the Midwest region compared to the United States as a whole, where labor supply is moderately responsive to the wage rate. These are positive results for the welfare reform, which promotes job preparation, work, and marriage. For these low-wealth families who are potentially eligible for TANF, the wage elasticity of labor supply is positive and the income elasticity is negative, implying that leisure is a normal good. These findings are similar to those obtained from an unrestricted sample. Hence, these "poor" families respond similarly to labor market incentives as do all families.

The model estimated in the paper is for the Midwest region and can be applied to other regions or particularly to the South region of the United States where a high percentage of the population is poor.

Endnotes

1. Other Midwest state percentage declines in AFDC/TANF recipients are: Illinois, 58.1 percent; Indiana, 53.3 percent; Iowa, 48.7 percent; Kansas, 57.5 percent; Michigan, 68.3 percent; Missouri, 51.5 percent; Nebraska, 41.4 percent, and Ohio, 64.6 percent.
2. Disutility from welfare is assumed to be separable.
3. The efficiency factor γ is equal to β_4 from the wage equation (10).

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