Regional Welfare Programs and Labor Force Participation

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Abstract

Welfare program dependency and expenditures rise during recessions, while income tax revenues from working people fall. Thus, now that states are responsible for their own welfare programs, they need to know how responsive their citizens are to workplace and safety net opportunities. This paper investigates household welfare program and labor force participation behavior. A choice-theoretic model is developed and estimated for each of the four census regions (Northeast, Midwest, South, and West) using cross-sectional data on households, labor markets, and policies. We show that household responses to welfare program parameters do differ regionally. But we find that labor supply does not depend on welfare program participation or program payoffs. Furthermore, unlike under the previous welfare program, participation in Temporary Assistance for Needy Families (TANF) does not significantly reduce household labor supply. The finding of significant differences across regions justifies the efficiency rationale for the devolution of authority to the states. We also discuss how states may be able to contain expenditures on welfare programs.

Keywords: labor force participation, regional welfare program participation, state welfare policies, TANF, Temporary Assistance for Needy Families.

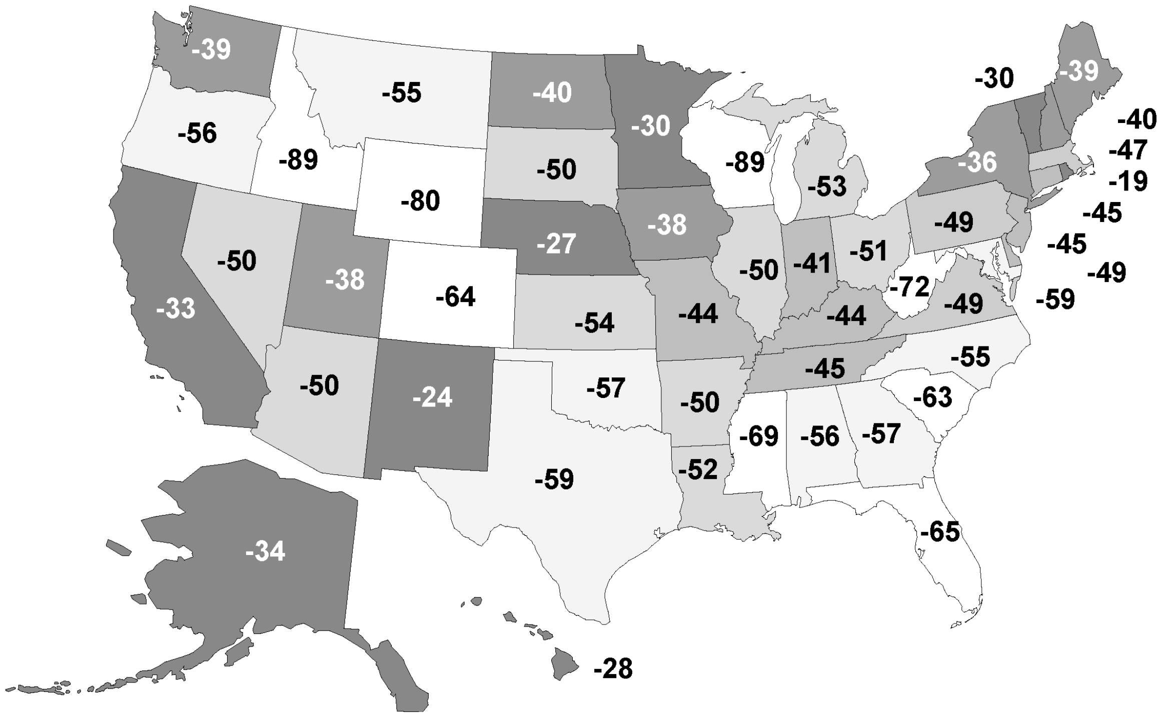
REGIONAL WELFARE PROGRAMS AND LABOR FORCE PARTICIPATION

Introduction

The Personal Responsibility and Work Opportunity Reconciliation Act (PRWORA) of 1996 gave states responsibility for administering their own versions of the Temporary Assistance for Needy Families (TANF) program. The presumption behind the act is that states can better tailor eligibility requirements, benefit levels, and implicit taxes on work to their local conditions, making welfare programs more effective at promoting labor force participation and self-sufficiency. Indeed, welfare recipiency declined across the nation after TANF went into effect (CEA 1997, 1999; Schoeni and Blank 2000). State welfare rolls, however, declined differentially (Saving and Cox 2000), as illustrated in Figure 1. One reason why welfare recipiency has declined more in some states than in others is that local economic opportunities differ. This paper investigates two other plausible reasons: differences in policies across regions and differences in how households respond to those policies.

We first test a (null) hypothesis that households' labor supply decisions do not depend on their welfare program participation decisions. If this is the case, differences in welfare programs across states will not affect state employment outcomes. We test the hypothesis by estimating the TANF program and labor supply decisions of thousands of categorically eligible households across four census regions of the United States. The variations in local labor market opportunities as well as program options across states allow us to identify household responses. The corollary null hypothesis is that TANF participation does not depend on labor supply.

The old income support program (Aid to Families with Dependent Children, or AFDC) dampened incentives to work and provided incentives to remain single (see Moffitt 1992). Hoynes (1996) found that the labor supply of married-couple households was highly responsive to changes in the AFDC benefit structure. Alternatively, Keane



Data: *Statistical Abstract of the United States: 2000*, Table 626, p. 392, U.S. Census Bureau.

FIGURE 1. Percentage change in the number of TANF families, 1995–99

and Moffitt (1998) found that changes in the wage had a larger effect on discrete labor force participation decisions than did changes in AFDC welfare benefits. They estimated a structural model of the choices to work and/or participate in multiple welfare programs among sole female-headed families. The two studies are reconciled given the evidence that the labor supply of singles is considerably less elastic than the labor supply of married persons (Heckman 1993).

The new TANF welfare program requires recipients to work, with some exemptions. Welfare program participants cannot substitute program participation for labor force participation, if this requirement is enforced or binding. Thus, under TANF, we may expect labor force participation to be less sensitive to program instruments. TANF participants may, nevertheless, work less than do non-participants.

The overarching objective is to test if household labor supply and TANF participation differ systematically across regions. Social mores about single parents or marriage, welfare stigma, and work ethics may vary systematically across locations because of

Tiebout sorting, for example (Epple, Romer, and Sieg 2001). In addition to variations in preferences, workplace opportunities and other safety net options also vary. The efficiency rationale for the devolution of authority over TANF to states (e.g., Brueckner 2000) is undermined if we find that households in different regions do not respond differently to TANF program instruments. If responses do differ, then the optimal levels and rates of TANF program instruments also differ, and state-tailored TANF programs should be more efficient than a one-size-fits-all program.

Our research here is similar in spirit to the work of Craig and Palumbo (1999), who examine interstate variability in unemployment insurance and welfare policies and outcomes from 1973 to 1989 (pre-PRWORA). They focused on states as the decision-makers and units of observation and concluded that states do make explicit policy choices. Here, we focus on households as the decisionmakers.

To model household choice, we use observations on all low-wealth families in the Survey of Income and Program Participation (SIPP). The variation across states in TANF policy instruments helps to statistically identify variation in household responses. We fit four models of household labor supply and welfare program participation, one for each of the U.S. census regions. The testable hypotheses are drawn from a model of family behavior in which work participation and program participation are each chosen to maximize family utility. We estimate this structural model and find significant differences in responses to at least one TANF program instrument across regions, as well as evidence that the new work requirements on TANF participants are binding.

The Choice Theoretic Model

The head of a household and the spouse, if present, are assumed to choose hours of work and to participate in the TANF program to maximize their household's utility. A household's income support and labor force participation decisions are interdependent. Labor supply decisions depend on TANF benefits because the income transfer relaxes the household's budget constraint. TANF participation decisions depend on labor supply because the higher is the earned income, the lower are the TANF benefits.

Following Moffitt (1983) and Hoynes (1996), we define the utility of a family as arising quasi-linearly from goods, time at home, and self-respect:

$$U(\mathbf{G}, H, S; \mathbf{Z}) = U(\mathbf{G}, H; \mathbf{Z}) + \delta(\mathbf{Z})T \quad (1)$$

where **G** denotes purchased goods, H is time at home, and $S = \delta(\mathbf{Z})T$ represents self-respect or stigma, which depends on household characteristics (**Z**). The indicator T equals 1 if the family participates in TANF and 0 otherwise, and $\delta<0$ is the marginal disutility or stigma of TANF participation. Rational TANF-eligible households will not participate if the disutility of doing so outweighs the utility from more goods and/or time at home.

The **Z** vector reflects the household's needs, preferences, and opportunities, such as family size, human capital, and local labor demand. For example, Hoynes (2000) examined the impacts of changes in local labor market conditions on participation in the AFDC program in California using the discrete duration models for exits and re-entry to welfare. She showed that higher unemployment rates, lower employment growth, and lower wage growth are associated with longer welfare spells and higher recidivism rates.

The state- and household-specific welfare program eligibility and payment criteria limit TANF benefits (B_{sh}) to whichever is lower, the state and household-specific benefit maximum $\bar{B}_{sh}$ (known as the payment standard) or the excess of $\bar{B}_{sh}$ over counted income:

$$B_{sh} = \min\{\bar{B}_{sh},\ \bar{B}_{sh} - [b_s(W_h L_h - i_s) + N_h]\}. \quad (2)$$

Counted income is household earned income ($W_h L_h$) less the earned income disregard (i_s) at the benefit reduction rate (b_s) plus unearned household income (N_h), which includes all other transfers, such as unemployment insurance. A second state TANF policy instrument i_s is the earned income disregard. It is the dollar amount of earned income not counted when calculating household eligibility for transfers. A third TANF policy instrument is the benefit reduction rate b_s, $0 \le b_s \le 1$. This is the rate at which additional dollars of earned income reduce the amount transferred. Thus, b_s is one way that states limit benefits per household. The earned income disregard i_s multiplied by b_s is a lump-sum incentive to work. States can choose the three parameters ($\bar{B}_{sh}$, b_s, i_s) to tailor their welfare programs to control enrollment and budget exposure as well as to provide incentives to eligible householders to work.

Given the opportunity for TANF income support and state-specific income tax rates, t_s, the household budget constraint is

$$(1 - T_h b_s - t_s) W_h L_h + (1 - T_h - t_s) N_h + T_h (b_s i_s + \bar{B}_{sh} - C_h) + \text{debt} = \mathbf{PG}_h \tag{3}$$

where $T_h = 1$ if the household participates in TANF and 0 otherwise, the vector product $\mathbf{PG}_h$ is the household's expenditure on goods, and C_h is the household's out-of-pocket costs of participating in TANF. The first term shows that the benefit reduction rate is an implicit tax on the earned income of participants. We hypothesize that it would affect the labor supply of TANF participants like an income tax. The third term on the left-hand side shows that the higher is the implicit tax on earned income through the benefit reduction rate, the higher is the value of the earned income disregard. Finally, debt is a substitute for income, whether earned, unearned, or transferred.

Household labor supply, L_h, is the sum of quality-constant or effective hours of work by the household head and spouse (if present): $L_h = L_{wife} + e^{\beta} L_{husband}$, where e^{β} is the ratio of male to female productivity. Likewise, the household wage, W_h, is the female's wage if both spouses are present or the household head is a woman; otherwise it is the male's wage. The household head and spouse, if present, allocate total time, D_h, to work, L_h, or stay at home, H_h, $D_h = L_h + H_h$.

Households choose the level of goods, time at home (or work time, L), and TANF participation, T, to maximize utility (1), internalizing the time constraint, subject to the budget constraint (3):

$$\max_{(G,L,T,\lambda)} U(\mathbf{G}, D-L; \mathbf{Z}) + \delta(\mathbf{Z})T + \lambda[(1 - Tb - t)WL + (1-T)N + T(bi + \bar{B} - C) + \text{debt} - \mathbf{PG}] \tag{4}$$

(with state and household are dropped for simplicity), where λ is the marginal increment to household utility of relaxing the budget constraint (3). The first-order conditions for a constrained utility maximum imply, among others, these structural relationships:

$$U_L = \lambda(1 - bT^* - t)W, \tag{5}$$

$$\delta(Z) = \lambda[\bar{B} - b(WL^* - i) - N - C]. \tag{6}$$

Thus, structural equations for T* and L* are

$$T^* = \frac{1}{b}\left[\frac{U_H(\mathbf{Z})\left[\overline{B} - b(WL^* - i) - N - C\right]}{\delta(\mathbf{Z})W}\right] - 1 + t \ = \ \tau\,(\overline{B}, b, i, t, L^*, N, C, W; \mathbf{Z}), \qquad (7)$$

$$L^* = -\frac{1}{bW}\left[\frac{\delta(\mathbf{Z})(1 - bT^* - t)W}{U_H(\mathbf{Z})} - \overline{B} + N + C - bi\right] = l(\overline{B}, b, i, t, T^*, N, C, W; \mathbf{Z}). \qquad (8)$$

These structural equations outline the main testable hypotheses. First, TANF participation depends on labor supply and vice-versa. By (7) we can also hypothesize that TANF participation is positively related to payment standards, $\overline{B}$, earned-income disregards, *i*, preferences or needs for time at home, ($U_H(\mathbf{Z}) > 0$), and participation is negatively related to benefit reduction rates, *b*. Also, by (8) and given $\delta(\mathbf{Z}) < 0$, labor supply is hypothetically positively related to wages, W, and negatively related to income tax rates, *t*, TANF participation, T*, benefit levels, and preferences or needs for time at home. Labor supply is ambiguous with respect to the benefit reduction rate, *b*.

The Data

The model is estimated using data on 6,482 categorically eligible households merged with data on local labor markets and state policies. The data about state TANF program instruments is collected from Rowe 2000, the *1998 Green Book* (U.S. House of Representatives 1998), and Gallagher et al. 1998 (Table 1). Information about unemployment rates is from the *Monthly Labor Review* (U.S. Department of Labor 1997). We use the ratio of the local area unemployment rate to the statewide average in the previous ten years as an indicator of local labor market conditions (as suggested by an insightful referee). We also include direct measures of states' non-welfare policy instruments such as income tax rates and unemployment insurance benefit levels. The data on unemployment insurance is the average weekly benefit for total unemployment (Social Security Administration 1998) and data on state-specific individual income taxes are from the Council of State Governments (1997).

The data about individuals and households are from the 1996 SIPP, wave 3. Excluded are data on the elderly (>65), households without children, and households with assets

TABLE 1. State TANF and employment outcomes and policy parameters

State	% TANF	RUR96 10-yr Avg.	Asset Limit ($)	B_{sh} ($)	i ($)	b (%)	UI ($)	IT (%)
Alabama	-56	0.67	2,000	137	0	80	142	2
Alaska	-33	0.87	1,000	821	150	67	172	0
Arizona	-50	0.86	2,000	275	90	70	151	2.87
Arkansas	-50	0.73	3,000	162	0	100	170	1
California	-33	0.98	2,000	493	225	50	152	1
Colorado	-63	0.66	2,000	280	120	67	208	4.63
Connecticut	-44	1.01	3,000	443	1157	100	222	3
Delaware	-45	1.19	1,000	270	120	67	224	2.2
D. Columbia	-27	0.99	1,000	298	100	50	236	4.5
Florida	-65	0.82	2,000	241	200	50	178	0
Georgia	-57	0.81	1,000	235	120	67	166	1
Hawaii	-27	1.42	5,000	452	200	44	270	1.4
Idaho	-89	0.77	2,000	276	0	100	182	1.6
Illinois	-50	0.72	3,000	278	0	33	213	3
Indiana	-40	0.62	1,500	229	120	67	187	3.4
Iowa	-37	0.69	5,000	361	0	40	200	0.36
Kansas	-54	0.84	2,000	352	90	60	202	3.5
Kentucky	-43	0.70	2,000	225	120	67	171	2
Louisiana	-52	0.67	2,000	138	1020	100	128	2
Maine	-38	0.72	2,000	312	108	50	171	2
Maryland	-59	0.88	2,000	313	0	65	195	2
Massachusetts	-46	0.73	2,500	474	120	50	254	5.3
Michigan	-53	0.60	3,000	371	200	80	205	4.1
Minnesota	-30	0.79	5,000	437	0	64	234	5.35
Mississippi	-69	0.66	1,000	96	90	100	141	3
Missouri	-43	0.77	5,000	234	120	67	154	1.5
Montana	-55	0.69	3,000	366	200	75	165	2
Nebraska	-27	0.78	6,000	293	0	80	161	2.51
Nevada	-50	0.83	2,000	289	0	50	194	0
New Hampshire	-40	0.85	2,000	481	0	50	153	0
New Jersey	-45	1.07	2,000	322	0	50	255	1.4
New Mexico	-24	0.94	1,500	410	150	50	157	1.7
New York	-36	0.95	2,000	467	90	55	206	4
North Carolina	-54	0.87	3,000	236	120	67	193	6
North Dakota	-40	0.58	5,000	340	0	62	175	2.1
Ohio	-50	0.77	1,000	279	250	50	202	0.743
Oklahoma	-57	0.68	1,000	225	120	50	175	0.5
Oregon	-55	0.84	2,500	427	0	50	191	5
Pennsylvania	-49	0.76	1,000	316	0	50	219	2.8
Rhode Island	-18	0.81	1,000	449	170	50	228	
South Carolina	-63	1.06	2,500	160	0	50	165	2.5
South Dakota	-50	0.70	2,000	380	90	80	150	0
Tennessee	-44	0.83	2,000	142	150	100	155	0
Texas	-59	0.78	2,000	163	120	67	189	0
Utah	-38	0.62	2,000	362	100	50	198	2.3
Vermont	-30	0.95	1,000	554	150	75	173	
Virginia	-49	0.82	1,000	231	120	67	168	2
Washington	-39	0.84	1,000	440	0	50	210	0
West Virginia	-71	0.71	2,000	201	0	60	176	3
Wisconsin	-89	0.60	2,500	440	120	67	202	4.6
Wyoming	-80	0.73	2,500	320	200	100	181	0

Sources: TANF participation: U.S. Census Bureau 2000; TANF Instruments: U.S. House of Representatives 1998; Gallagher et al. 1998; Unemployment rates: U.S. Department of Labor 1997; Unemployment insurance (UI): Social Security Administration 1998; Income tax (IT): The Council of State Governments 1997.

above the state TANF eligibility limits (Table 1). The 1996 panel is representative at the level of the main census regions, but the sample is insufficient at the state level or lower. All household variables are measured in the month of November 1996. These include whether the spouse is present, the number of children of various ages, a dichotomous variable indicating whether or not the household lives in a metro area, family unearned income, whether or not the household has a car, preexisting debt, and assets. We code a household as participating in TANF ($T_h = 1$) if any member is recorded as receiving TANF support during November 1996 (children also can be recipients).

Household composition varies across regions. The Northeast region subsample contains observations on 1,038 households, of which 56 percent are married-couple families, and 93 percent live in metro areas. The West subset contains 1,534 households: 62 percent married-couple families, 82 percent metro. The South subset has 2,361 households: 63 percent married-couple families, 69 percent metro. And the Midwest subset has 1,549 households: 68 percent married-couple families, 76 percent metro. Table 2 displays the means and standard deviations of the dependent and independent variables.

The Empirical Specification

We estimate the two-equation structural model—equations (7) and (8)—of a dichotomous TANF participation choice, T_h, and continuous hours of household labor supply, L_h. To test for regional variations, we fit the models to four subsamples of census regions: the Northeast, Midwest, South, and West. The variation in TANF and other program parameters among the states in each region makes it possible to identify region-specific responses to state-specific policy instruments.

The structural hypothesis is that labor supply depends on TANF participation, and that TANF participation depends on labor supply. We estimate the system in two stages, as in Nelson and Olson (1978). First, we estimate two reduced-form equations, one for a household's TANF participation choice and the other for total household labor supply.

Because the utility of TANF participation is a latent variable, the reduced-form participation choice is estimated by $T_h = 1$ if $T_h^* > 0$, and 0 otherwise, where

TABLE 2. Definitions, means, and standard deviations of variables

	Mean (Standard Deviation)				
	Northeast (N=1,038)	**Midwest (N=1,549)**	**South (N= 2,361)**	**West (N=1,534)**	**Description**
Age	36.64 (8.33)	35.63 (8.32)	35.79 (8.65)	35.86 (8.55)	Age of head if single-head family, and average age of head and spouse if married-couple family
Agesq	1411.4 (631.9)	1338 (631.25)	1355.8 (658.24)	1358.65 (646.62)	Age squared
B	582.2 (160.85)	453.53 (141.87)	274.46 (91.83)	652.79 (222.78)	Maximum TANF grant per month in $
b	0.49 (0.12)	0.58 (0.16)	0.52 (0.25)	0.54 (0.08)	The rate at which additional dollars of earned income reduce the TANF benefit
Car	0.68 (0.47)	0.84 (0.36)	0.83 (0.38)	0.82 (0.39)	Dichotomous variable equal to 1 if a family owns a car, van, or truck and 0 otherwise
Debtk	80.79 (50.87)	78.13 (45.66)	69.13 (40.78)	74.68 (55.79)	Total secured debt
Disabled	0.09 (0.29)	0.09 (0.28)	0.09 (0.28)	0.08 (0.27)	Dichotomous variable equal to 1 if family head is disabled and 0 otherwise
Edu	12.44 (2.17)	12.42 (2.17)	11.88 (2.57)	11.47 (3.36)	Years of schooling of head if single family; average years of schooling of head and spouse if married couple
i	118.68 (264.24)	106.54 (94.98)	157.23 (210.07)	164.68 (84.43)	The dollar amount of earned income not counted when calculating the household's transfer
IncTax	3.21 (1.28)	2.88 (1.52)	1.44 (1.77)	1.55 (1.22)	State individual low-income tax rate (%)
Kids6	0.70 (0.81)	0.71 (0.85)	0.70 (0.83)	0.81 (0.89)	Number of children in family younger than age 6
Kids13	0.75 (0.88)	0.83 (0.92)	0.77 (0.88)	0.87 (0.95)	Number of children between ages 6 and 13
Kids18	0.52 (0.75)	0.50 (0.72)	0.50 (0.72)	0.48 (0.72)	Number of children between ages 13 and 18
L	4.01 (0.52)	4.09 (0.55)	4.07 (0.50)	4.03 (0.53)	Natural log of hours worked last week by head if single, or effective hours of work if married-couple family
Ln(wage)	2.22 (0.44)	2.23 (0.43)	2.07 (0.41)	2.21 (0.45)	Natural log of hourly wage ($)
Male	0.60 (0.49)	0.68 (0.47)	0.69 (0.46)	0.70 (0.46)	Dichotomous variable equal to 1 if male adult is present in a family, and 0 otherwise
Married	0.56 (0.50)	0.68 (0.47)	0.63 (0.48)	0.62 (0.48)	Dichotomous variable equal to 1 if spouse present, and 0 other-wise
Metro	0.93 (0.26)	0.76 (0.42)	0.69 (0.46)	0.82 (0.38)	Dichotomous variable equal to 1 if a family lives in metro area, and 0 otherwise

TABLE 2. Continued

	Mean (Standard Deviation)				
	Northeast (N=1,038)	**Midwest (N=1,549)**	**South (N= 2,361)**	**West (N=1,534)**	**Description**
Nlabinc	53.96 (126.47)	44.96 (112.64)	17.91 (54.85)	48.53 (135)	Family non-labor income exclusive of welfare transfers per month ($)
P_L	3.91 (0.33)	4.04 (0.33)	4.03 (0.32)	3.92 (0.30)	Predicted natural log of hours worked last week by head if single, or effective hours of work if married couple family ($\hat{L}_h$, see text)
P_T	0.15 (0.22)	0.15 (0.21)	0.12 (0.17)	0.17 (0.22)	Predicted TANF participation ($\hat{T}_h$, see text)
T	0.16 (0.36)	0.15 (0.36)	0.12 (0.32)	0.17 (0.37)	Dichotomous variable equal to 1 if a household participates in TANF, and 0 otherwise
U	0.90 (0.12)	0.71 (0.07)	0.80 (0.10)	0.91 (0.11)	Ratio of the area unemployment rate to the state's past ten-year average unemployment rate
UI	221.68 (21.89)	199.77 (21.50)	173.89 (19.25)	164.09 (21.59)	State average weekly benefit for total unemployment
White	0.71 (0.45)	0.79 (0.40)	0.68 (0.47)	0.83 (0.38)	Dichotomous variable equal to 1 if family head is white, and 0 otherwise

Note: Standard deviations are in parentheses.

$$T_h^* = \mathbf{X}\boldsymbol{\alpha}_{T1} + \mu_{T1}. \tag{9}$$

Using probit, the probability of TANF participation is $\text{Prob}(T_h{=}1) = \frac{1}{\sqrt{2\pi}} e^{-\mathbf{X}\alpha^2/2}$. The explanatory variables (vector **X)** include the **Z** vector of exogenous variables such as household demographic characteristics, labor market characteristics, and the state tax and policy variables. The estimated function $\mathbf{X}\boldsymbol{\alpha}_{T1}$ serves as the instrument for $\hat{T}_h$ in the second-stage structural equation for labor supply.

The labor supply model is more complex. First, because observed wages also are endogenous to the choice to work, we have to control for this self-selection bias by estimating the inverse Mills ratio from a probit model of the probability that individual "i" works:

$$\text{Prob(work}_i) = \frac{1}{\sqrt{2\pi}} e^{-\mathbf{X}_w\boldsymbol{\beta}^2/2} \tag{10}$$

where $\mathbf{X}_w$ = {age_i, age_i^2, $education_i$, $male_i$, $white_i$, $metro_i$, number of children under age 6, age 6-12, age 13-18, $married_i$, non-labor income, and the relative area unemployment rate}. This function is estimated for each individual household head and each spouse (if present). Then an inverse Mills ratio, λ_{Li}, is found as the ratio of the cumulative normal density function divided by the probability density function for each individual.

Next, an instrument for W, the return per hour to each individual's labor, is estimated as an ordinary least squares function of human capital, demographics, and labor market variables:

$$\ln(wage_i) = \beta_0 + \boldsymbol{\beta_1 D} + \beta_2 U + \beta_3 \lambda_L + \mu_w \qquad (11)$$

where **D** is a vector of demographic variables, U is the relative area unemployment rate, λ_L is the inverse Mills ratio controlling for self-selection into the labor force, and μ_w is a normal random error term. Third, assuming that wages reflect productivity, we use the coefficient β_{male}, estimated in (11), to construct the productivity-weighted total effective household labor supply.

The wage equations estimated for each region are reported in Table 3. The joint test that all the non-intercept coefficients (except for the coefficient on the selection term) are zero is rejected. The sample F-values, compared to the critical value 1.75, are 6.20 (Northeast), 22.32 (Midwest), 29.73 (South), and 10.11 (West).

Wages are concave in age, peaking at age 55 in the Northeast, compared to age 52 in the West, age 49 in the South, and age 46 in the Midwest. The coefficients with respect to the other variables are also consistent with other labor studies (Neal and Johnson 1996; Blau and Kahn 2000). Wages are higher for males and whites. We find other interesting regional variations as well. One additional year of schooling (higher labor productivity) has the direct effect of increasing the wage by 5.8 percent in the Midwest, 4.4 percent in the South, 4.1 percent in the Northeast, and 3.6 percent in the West. Wages for metro householders are higher than for non-metro householders by 7 percent in the West, 6.8 percent in the Midwest, 4.5 percent for the Northeast, and 3.9 percent for the South.

Having defined household labor supply in terms of female labor units as $L_h = L_{wife} + e^{\beta male} L_{husband}$, we use the β_{male} estimated in equation (11) in $e^{\beta male}$ for the ratio of male to female productivity (Griliches 1970). Thus, in households with a female head or if

Table 3. Estimates of the wage (lnwage)

	Northeast	Midwest	South	West
Intercept	0.559	-0.229	0.105	0.859
	(0.476)	(0.303)	(0.277)	(0.282)***
Age	0.040	0.066	0.040	0.036
	(0.016)***	(0.010)***	(0.009)***	(0.010)***
Agesq	-0.0004	-0.0007	-0.0004	-0.0003
	(0.0002)*	(0.0001)***	(0.0001)***	(0.0001)***
Edu	0.041	0.058	0.044	0.036
	(0.013)***	(0.008)***	(0.006)***	(0.007)***
White	-0.009	0.077	0.073	0.030
	(0.041)	(0.035)**	(0.020)***	(0.041)
Metro	0.045	0.068	0.039	0.070
	(0.055)	(0.026)***	(0.019)**	(0.032)**
Male	0.163	0.222	0.226	0.115
	(0.054)***	(0.034)***	(0.025)***	(0.039)***
U	0.025	0.007	0.381	0.023
	(0.136)	(0.145)	(0.013)***	(0.127)
λ_w	0.071	0.161	0.074	-0.209
	(0.182)	(0.125)	(0.110)	(0.151)
R^2	0.108	0.172	0.171	0.162
F Statistic	10.97	35.20	47.72	28.77
Number of observations	736	1,366	1,863	1,204

Note: Standard errors are in parentheses. *Statistically significant at the 10% level. **Statistically significant at the 5% level. ***Statistically significant at the 1% level.

both spouses work, the instrumented female wage is the appropriate measure of the "household" wage. If the household head is male and the spouse does not work, the household labor supply is the male's labor supply, and the instrument is the male's estimated wage. The aggregate defaults to female hours and the female's estimated wage in households with no working male.

Next, we estimate the first-stage, reduced-form model of aggregate household labor supply $\ln(L_h)$ as a linear function of all the exogenous variables (**X**) plus the labor force self-selection term λ_L estimated in equation (11) using ordinary least squares:

$$\ln(L_h) = \mathbf{X}\boldsymbol{\gamma}_L + \gamma_\lambda \lambda + \varepsilon. \quad (12)$$

The estimated function will be used to instrument $\hat{L}_h$ in the structural equation for TANF participation.

Finally, the two instruments ($\hat{T}_h, \hat{L}_h$) are included as arguments in the structural equations:

$$\text{Prob}\ (T_h=1) = \frac{1}{\sqrt{2\pi}} e^{-\mathbf{X}\phi^{2}/2}, \tag{13}$$

$$\ln(L_h) = \gamma_0 + \gamma_1 \ln(\hat{wage}_h) + \gamma_2 \hat{T}_h + \boldsymbol{\gamma}_3 \mathbf{Y}_L + \boldsymbol{\gamma}_4 \mathbf{F}_L + \boldsymbol{\gamma}_5 \mathbf{Z}_L + \gamma_6 \lambda_L + \mu_L \tag{14}$$

where $\mathbf{X}\boldsymbol{\phi}$ is $\phi_0 + \phi_1 \hat{L}_h + \boldsymbol{\phi}_2 \mathbf{Y}_T + \boldsymbol{\phi}_3 \mathbf{F}_T + \boldsymbol{\phi}_4 \mathbf{Z}_T + \mu_T$. The vectors $\mathbf{Y}_L$ and $\mathbf{Y}_T$ are local employment opportunity variables, $\mathbf{F}_L$ and $\mathbf{F}_T$ are local fiscal policy tax and transfer variables, and $\mathbf{Z}_L$ and $\mathbf{Z}_T$ are other household characteristics.

The system is estimated equation by equation using probit for the TANF participation equation and least squares for labor supply. The instrument for $\hat{L}_h$ in the structural TANF equation (13) is predicted hours of labor (equation [12]), and the instrument for $\hat{T}_h$ that enters the structural labor supply equation (14) is the function $\mathbf{X}_T\hat{\boldsymbol{\alpha}}$ (equation [9]). Nelson and Olson (1978) have shown that the estimates obtained by this procedure are consistent. Furthermore, because we include the self-selection term λ_L in (14), the error term μ_L has a zero mean. If it were estimated without taking into account the probability of self-selection, it would not have a zero mean, and parameter estimates would be biased and inconsistent.

The exact empirical specifications of structural equations of the choice variables are shown in Tables 4 and 6. Note that education is excluded from the labor-force participation equation (14) to identify the wage effect in labor supply, because it was included in equation (11) to estimate the wage, according to the convention in labor research (Keeley 1981; Heckman 1993).

Estimation Results

TANF Program Participation

Estimates of the instrumental variables in welfare participation (equation [13]) are presented in Table 4. Opportunities, needs, and preferences explain TANF participation in intuitively reasonable ways that echo the findings in the existing literature. In all regions, if the family head is male and if he has more years of education, then the probability that the family participates in TANF is statistically significantly lower.

TABLE 4. Instrumental variable estimates of TANF program participation

	Northeast	Midwest	South	West
Intercept	13.595	18.755	13.713	12.932
	(3.085)***	(4.741)***	(2.576)***	(2.517)***
Age	-0.057	-0.043	0.041	-0.022
	(0.031)*	(0.023)*	(0.017)**	(0.022)
Agesq	0.0004	0.0003	-0.0009	0.0005
	(0.0004)	(0.0003)	(0.0003)***	(0.0003)*
Male	-1.010	-0.131	-0.330	-0.221
	(0.401)**	(0.318)	(0.225)	(0.216)
Married	1.948	1.903	1.857	1.049
	(0.591)***	(0.655)***	(0.416)***	(0.324)***
Kids6	0.070	0.032	0.182	0.061
	(0.117)	(0.084)	(0.063)***	(0.072)
Kids13	0.219	0.004	-0.013	0.008
	(0.104)**	(0.069)	(0.055)	(0.069)
Kids18	0.199	0.108	0.218	-0.208
	(0.119)*	(0.092)	(0.063)***	(0.084)**
Nlabinc	-0.001	0.001	-0.001	-0.001
	(0.0005)*	(0.001)	(0.0007)**	(0.0004)***
Edu	-0.057	-0.001	-0.009	0.015
	(0.032)*	(0.031)	(0.020)	(0.015)
Debtk	-0.005	-0.009	-0.006	-0.004
	(0.003)*	(0.002)***	(0.002)***	(0.001)***
Car	-0.401	-0.209	-0.062	-0.180
	(0.159)**	(0.185)	(0.138)	(0.142)
P_L	-3.510	-4.706	-4.415	-3.928
	(0.861)***	(1.326)***	(0.780)***	(0.682)***
U	1.336	-0.856	1.311	-0.389
	(0.575)**	(0.755)	(0.485)**	(0.724)
B	0.001	0.001	0.002	0.001
	(0.001)	(0.001)	(0.0005)***	(0.0004)**
b	-1.973	-0.065	-0.132	0.948
	(2.218)	(0.434)	(0.209)	(0.904)
i	-0.001	-0.001	0.0005	0.001
	(0.001)	(0.0008)*	(0.0002)**	(0.001)
Log Likelihood	-278.39	-416.46	-587.15	-456.20
Number of observations	1,038	1,549	2,361	1,534

Note: P_L is the predicted household labor supply. Standard errors are in parentheses. *Statistically significant at the 10% level. **Statistically significant at the 5% level. ***Statistically significant at the 1% level.

Debt appears to substitute for TANF participation in all regions, as hypothesized. A family with very young children is more likely to participate in TANF and less likely to be in the labor force. Families with cars are less likely to participate in TANF and more likely to work. And most important, for all regions, the more a household works, the lower is the probability that the family participates in TANF.

There are some regional differences. In particular, higher nonlabor income significantly decreases the probability of TANF participation in all but the Midwest. And the probability of participation in TANF significantly increases with unusually high unemployment rates in the Northeast and South.

Furthermore, the response to policy instruments varies across regions. In all regions, TANF participation is positively related to the TANF payment standard ($\bar{B}_{sh}$) as hypothesized. But the effect is statistically significant only in the South and West. TANF participation is significantly related to the earned income disregard (i_s) only in the Midwest and the South. Neither TANF participation nor labor supply appears to be statistically significantly sensitive to the benefit reduction rate (b_s), the implicit tax on earned income.

The test for significantly different behavioral responses across regions was constructed as follows. Under the null hypothesis, φ_{ir} - φ_{ik} = 0 for each explanatory variable *i*, pairwise for regions *r* and *k*. The test statistic is

$$t = \frac{(\hat{\varphi}_r - \hat{\varphi}_k) - (\varphi_r - \varphi_k)}{\sqrt{SE(\hat{\varphi}_r)^2 + SE(\hat{\varphi}_k)^2}} = \frac{(\hat{\varphi}_r - \hat{\varphi}_k)}{\mathrm{S(d}\mathit{iff})}$$

(with variable subscripts *i* dropped for ease of exposition). Table 5 summarizes our findings about differences in regional TANF program participation at the 5 percent level of significance.

Northern and southern poor are significantly more sensitive to higher unemployment rates than are midwestern poor. Midwestern poor are less likely to go off TANF at higher levels of unearned income (such as alimony or child support) than are southern or western poor. Midwestern poor are also less sensitive to the income disregard TANF policy parameter that encourages work. Southern household participation in TANF differs significantly with respect to the life cycle: TANF participation is concave with respect to age in the South and convex (with lowest participation rates among the middle-aged) elsewhere. This is consistent with the convex life-cycle TANF participation profile among rural households identified by Kilkenny and Huffman (2003). And, having more teenaged children ("age18") discourages TANF participation in the West but encourages it in the other three regions. And, among northerners only, having less education significantly increases the probability that the household participates in TANF.

TABLE 5. Significant differences in TANF behavior among regions

		TANF participation in COLUMN region is less positively related to:			
		Northeast	**Midwest**	**South**	**West**
TANF participation in ROW region is more positively related to:	Northeast		U		age18
	Midwest			nlabinc	age18 nlabinc
	South	age car	age car i		age18 age
	West	edu	i		

Labor Supply

While TANF participation is sensitive to state-specific TANF program parameters and labor supply, labor supply is not significantly sensitive to state tax or unemployment insurance rates in any of the regions. Our finding that labor supply is not significantly related to the TANF policy's benefit reduction rate is consistent with the recent literature that labor supply is ambiguous with respect to implicit taxes (Moffitt 2002).

Table 6 shows the instrumental variable labor supply equations (equation [14]) for each census region. The response of household labor supply to an increase in the return to labor ($\ln(\hat{wage})$) is positive as hypothesized, but it is statistically significant only in the Midwest. We estimate the elasticity of TANF-eligible household labor supply with respect to the wage to be 0.033. That is, a doubled return to female labor (+100 percent) is associated with a 3 percent increase in the total hours worked by a TANF-eligible midwestern household. Gender matters with respect to labor supply in the Midwest and the West, where the

TABLE 6. Instrumental variable estimates of the labor supply (lnhours)

	Northeast	Midwest	South	West
Intercept	3.647	3.629	3.803	3.368
	(0.415)***	(0.346)***	(0.184)***	(0.373)***
Age	-0.003	-0.002	0.005	-0.0005
	(0.007)	(0.006)	(0.004)	(0.006)
Agesq	-0.0000	0.0001	-0.0001	-0.00001
	(0.0001)	(0.0001)	(0.00005)**	(0.0001)
Male	0.063	0.210	0.045	0.154
	(0.122)	(0.086)**	(0.074)	(0.087)*
Married	0.486	0.422	0.507	0.356
	(0.077)***	(0.065)***	(0.048)***	(0.067)***
Kids6	-0.019	-0.067	-0.008	-0.024
	(0.037)	(0.029)**	(0.028)	(0.022)
Kids13	0.027	-0.048	-0.020	-0.043
	(0.023)	(0.019)**	(0.017)	(0.018)**
Kids18	0.037	0.018	0.025	-0.034
	(0.024)	(0.022)	(0.019)	(0.021)
Disabled	-0.157	-0.048	-0.139	-0.164
	(0.082)**	(0.064)	(0.054)**	(0.066)**
Car	0.063	0.099	0.116	0.125
	(0.052)	(0.051)*	(0.037)***	(0.050)**
Nlabinc	-0.00004	0.0002	-0.0001	-0.0002
	(0.0001)	(0.0001)*	(0.0002)	(0.0001)*
$\ln(\hat{wage})$	0.021	0.033	-0.030	0.032
	(0.038)	(0.019)*	(0.025)	(0.025)
P_T	-0.033	-0.024	-0.015	-0.031
	(0.044)	(0.034)	(0.044)	(0.038)
λ_W	-0.012	0.182	-0.329	0.076
	(0.287)	(0.199)	(0.144)**	(0.229)
U	0.028	0.138	0.188	-0.220
	(0.145)	(0.197)	(0.125)	(0.196)
UI	-0.0004	-0.002	-0.0002	-0.0005
	(0.001)	(0.001)	(0.001)	(0.0007)
IT	-0.017	0.025	0.007	0.002
	(0.012)	(0.014)*	(0.006)	(0.013)
b	-0.105	-0.089	-0.049	0.283
	(0.118)	(0.120)	(0.048)	(0.218)
R^2	0.333	0.283	0.322	0.251
F Statistic	23.80	30.16	55.81	24.21
Number of observations	827	1,318	2,017	1,248

Note: P_T is the predicted TANF participation. Standard errors are in parentheses. *Statistically significant at the 10 % level. **Statistically significant at the 5 % level. ***Statistically significant at the 1 % level.

household works more hours if the head is male. These results are consistent with the labor supply literature. Blundell and Macurdy (1999) report that the elasticity of labor supply with respect to the wage is close to zero for men and is positive for women.

Labor supply is greatly enhanced by the presence of a two-parent family. It is significantly higher if both spouses are present ("Married"), and lower if the household head is disabled (see also Heckman 1993). Also, labor supply is concave in age in the South but not statistically significant with respect to age in the other regions. The older is the midwestern (southern) householder with younger children, the fewer are the hours worked. Other differences include that one additional child under age 6 decreases midwestern household hours of work by 6.7 percent, while in the Northeast, South, and West, the effects of additional children on labor supply are not statistically significant. The household's having access to a car significantly increases the hours of labor supplied in all regions except the Northeast. This may be because of the higher levels of public transport available in the Northeast, but a more detailed investigation of this effect is needed.

Conclusions

We have posed and estimated a model of household labor supply and TANF program participation in the four census regions. According to our estimates, the null hypotheses that household decisions to work are independent of decisions to participate in welfare cannot be rejected. We find no statistically significant evidence that labor supply depends on TANF program participation or program payoffs. Welfare program participants do not work systematically less than non-participants, all else being equal. This was one of the goals of welfare reform. Variations in welfare program benefits and implicit taxes on earned income are no longer significant determinants of employment outcomes across states.

Our findings that TANF benefit rates and TANF participation no longer affect labor supply contrast with pre-reform findings that household labor supply was sensitive to AFDC benefit rates (Keane and Moffitt 1998, Hoynes 2000). The difference between the old welfare program and the TANF program that may account for this change in sensitivity is the new requirement that all TANF participants work. If this requirement binds, other inducements or deterrents may be irrelevant. Our findings are consistent with the hypothesis that the TANF work requirements bind.

Furthermore, higher wages encourage increased labor supply by poor households only in the Midwest, where both spouses are more often present. The most significant determinants of hours worked are the number of dependents (spouse and children) relative to other sources of income in the household. These findings imply that American poor work only as much as they must to support their children and other dependents. These households also work less if they have more unearned income or credit: they substitute unearned for earned income. But they are not allowed to substitute welfare benefits for earned income under the TANF program. And again, our evidence shows that they do not work less when they are receiving TANF benefits.

We reject, however, the null hypothesis that state policies have no affects on household participation in TANF. Furthermore, we reject the null hypothesis that households in all regions respond similarly to TANF policy instruments. These findings support the efficiency rationale for the devolution of authority over TANF to the states. Since household responses to welfare program parameters do differ regionally, state-tailored TANF programs could be more efficient at controlling TANF budget outlays than a one-size-fits-all nationwide program.

Because TANF participation is significantly (inversely) related to working and positively related to local unemployment rates, TANF participation will increase during economic contractions. Workplace opportunities matter; dependence on welfare is not entirely a lifestyle choice. But it is a choice to some extent, so state governments can influence the participation rate by setting payment caps and implicit tax rates. In the South and West, a decrease in the payment standard ($\bar{B}_{sh}$) would lead to decreased TANF participation (and decreased outlays on the TANF program). Indeed, from 1997 to 2000, states in the West reduced pay standards, and welfare participation declined during those years (U.S. Dept. of Health and Human Services 2000). In the South, a decrease in the earned income disregard would also discourage TANF participation (and reduce outlays). The options for the Midwest are the reverse; the earned income disregard could be increased to discourage TANF participation. As Table 1 makes clear, one southern state, Louisiana, offered an unusually high earned income disregard, while many of the midwestern states offered no earned income disregards at all in 1996. Finally, our estimates suggest that all states could raise benefit reduction rates (b_s), an implicit tax on earned income, without encouraging more TANF participation or discouraging labor force participation. This could help states contain the budget deficits that rise during recessions.

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