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RURAL, SUBURBAN AND URBAN SINGLE MOTHERS' AFDC AND FSP PARTICIPATION AND LABOR SUPPLY: LESSONS FOR WELFARE REFORM

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Abstract

Since passage of the Personal Responsibility and Reconciliation Act of 1996 (PRWORA), states have the responsibility of developing and implementing their own Temporary Assistance to Needy Families (TANF) programs to operate in tandem with the Federal Food Stamp Program (FSP). The context for this welfare reform included a booming economy and broad public perception that welfare programs severely reduce the work effort of recipients. This study focuses on a period when the economy was in recession and investigates how the old cash welfare program, AFDC, and the FSP affected labor supply (weekly hours of work) decisions for single mothers, the majority of welfare recipients, across the rural-urban continuum. The central question is how the labor supply of single mothers responded to the availability of AFDC and FSP benefits, respectively, and whether their responses differed depending upon whether they reside in rural or urban areas.

To answer this question, we utilize data from a special in-house Census Bureau extract from the Survey of Income and Program Participation with accurate rural and urban sub samples to estimate our three equations model, one for labor supply and one each for AFDC and FSP participation. The econometric model involves two linked components. The first is Bivariate Probit estimation of the AFDC and FSP participation decisions to account for possible correlation between the error terms of the participation equations. The participation estimates are linked to the second component, estimation of the labor supply equation, due to the endogeneity of the participation decisions and the possibility of bivariate selection. Single mothers may and do choose participation in either or both AFDC and the FSP and unobserved characteristics associated with those participation choices are likely to be negatively correlated with unobserved factors affecting labor supply. The participation estimates are used to calculate bivariate sample selection correction factors added as auxiliary variables in the labor supply equation. Because wages play important roles in all three equations, yet are observed only for women who work, we first impute wages based upon Heckman's two-step sample selection bias correction procedure for rural and urban sub samples. The results show that bivariate rather than univariate participation estimation is necessary. The bivariate selection corrections in the labor supply equations, however, yield mixed results. Nonetheless, the estimated model reasonably explains linkages between AFDC and FSP programs and labor supply.

The results show that increasing the AFDC tax on earnings by 10 percent generates almost identical average increases in labor supply by rural and urban single mothers, 0.12 and 0.11 hours per week, respectively. Their responses are also similar with respect to a 10 percent increase in the FSP earnings tax, 0.03 and 0.04 hours per week on average. A 10 percent increase in AFDC and FSP unearned income tax rates yield average rural labor supply increases of 0.11 and 0.02 hours per week, respectively, and corresponding urban responses of 0.01 and –0.02 hours per week. With one exception, rural and urban single mothers reduce hours of work as expected when AFDC and FSP guaranteed benefits increase by 10 percent. For the AFDC benefit increase, rural single mothers reduce labor supply less on average than do urban single mothers, -0.08 vs. -0.12 hours per week. The FSP benefit increase generates the largest reduction in labor supply, -0.35 hours per week for rural single mothers, compared to a labor supply increase of 0.14 hours per week by urban single mothers.

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I. INTRODUCTION

The welfare reform legislation, the Personal Responsibility and Work Opportunity and Reconciliation Act of 1996 (PRWORA), transformed federal social welfare policy. The Act eliminated the Federal guarantee of cash benefits to low income families with children by abolishing the Aid to Families with Dependent Children (AFDC) entitlement program. In its place, PRWORA transferred the responsibility for Temporary Assistance to Needy Families (TANF) design and implementation to each state, imposed significant new work requirements and 5-year lifetime limits on benefits, and established fixed block grants to states for operating these programs. The Act preserved the Federal commitment to food assistance through the Food Stamp Program (FSP), albeit with limitations on eligibility and reduced benefits. Thus, states had the difficult challenge of developing their own TANF cash assistance programs to operate in tandem with the Federal FSP. Now, some TANF recipients are hitting the 5-year limit and the economy is in recession.

Then, the context for states' TANF program design decisions was one of fixed Federal block grants, which do not adjust as economic conditions change, and broad public perception that welfare programs severely reduce the work effort of recipients. This study addresses whether that perception is correct by focusing on how the old cash welfare program, AFDC, and the FSP affected labor supply (hours of work) decisions of single mothers, the majority of welfare recipients. This study also accounts for how single mothers' decisions vary depending upon their households', and their residential areas' characteristics. The central question is how the labor supply of single mothers responds to the availability of AFDC and FSP benefits, respectively, and whether their responses differ depending on where they live along the rural-urban continuum.

This report is structured as follows: Section II details the source and unique characteristics of the data utilized herein and describes labor supply, program participation, and other characteristics of the rural, suburban and urban single mothers. Section III details the theoretical framework for explaining single mothers' labor supply and program participation decisions based on the microeconomic theory of utility maximization. Section IV develops an econometric representation of the theoretical decision making framework. The model accounts for econometric problems associated with estimating the complex set of three interrelated choices facing each single mother, AFDC participation, FSP participation, and labor supply (hours of work). This section also reports and discusses the estimation results. A discussion of the policy implications of those results follows in Section V. The final section, VI, provides conclusions and implications for further research.

This study makes a number of unique contributions. Geographically-specific data from the Survey of Income and Program Participation are utilized. This geographic specificity is not available in the publicly released data. All discussion and analyses highlight differences and similarities between rural, suburban and urban single mothers and their households. Theoretical and econometric frameworks for understanding the determinants of single mothers' AFDC and FSP program participation and labor supply decisions are built. The econometric model is estimated separately for rural, suburban and urban single mothers. Finally, manipulation of the econometric results yields insights regarding how changing cash assistance and FSP policy parameters affect joint program participation and labor supply decisions of rural, suburban and urban single mothers. Together, these unique contributions can alert state policy makers to the need to consider how their single mothers array across the rural-urban continuum as they evaluate and perhaps redesign their own TANF cash assistance programs.

II. DATA AND DESCRIPTIVE ANALYSIS

A. Data

To accomplish the research objectives outlined above, we utilize the Census Bureau's Survey of Income and Program Participation (SIPP). The survey is a multi-panel longitudinal survey of persons 15 years or older. Data are also collected on all other persons who live with or move in with members of the original sample. One can obtain cross-sectional views of respondents at one point in time as well as longitudinal views of changes in economic circumstances and household composition over time. Furthermore, SIPP is the only nationally representative data available that contains all the appropriate sociodemographic data as well as exhaustive lists of income and assets information essential for determining means-tested transfer program eligibility. Earnings and self-employment information, including wages and hours of work from up to four jobs and self-employment activities are collected for all adults in the household.

Initially, it appeared that these data would be unusable because the public use version of SIPP does not allow accurate identification of a crucial piece of information, place of residence. Only a special metropolitan subsample is identified within the public use version. Non-metropolitan or rural households are identified only in the most populous states. In all other states, the true place of residence for rural households, in particular, is masked to preserve confidentiality. The Census Bureau graciously removed this barrier.

The Bureau made an in-house version of the first panel of SIPP, the 1984 Panel (initiated in October 1983) available. This version contains actual place of residence and other geographically linked information. The 1984 Panel of SIPP is a nationally representative sample of 19,878 households in the civilian non-institutionalized population. The adults in the sampled households were interviewed. Monthly economic and demographic information was collected over a three-year period. Until 1996, subsequent panels were initiated each calendar year and cover 28, 32 or 36 months with sample sizes varying from 12,500 to 23,500 (General Accounting Office). Each panel is divided into four sub-samples or rotation groups. Each group is interviewed in a separate month with a complete, cycle or wave, completed after four months. At every interview, questions are asked regarding each of the four months since the previous interview.[1]

For this study, a cross-section from the fourth month of the third wave of the 1984 Panel was chosen. That is, data for the month prior to the third wave interview were extracted. Depending on the rotation group, the data relate to the months of May, June,

[1] For more information, see the SIPP Users Guide (1987).

July or August 1984. At that time, 18,941 households were interviewed. Single mothers headed 1500 of the households. Of these, 644 single mothers resided in urban areas, 519 resided in suburbs and 337 resided in rural areas.[2] The labor supply and program participation decisions of these single mothers and other characteristics of these women and their households are presented in the next section.

Before proceeding, however, one potential data-related concern must be addressed. A reasonable person might ask, "How can data collected in 1984 inform today's policy concerns?" A first, straightforward response is that these data provide unique information. At least two other analyses of single mothers' AFDC and FSP participation and labor supply behavior have been done (Fraker and Moffit and Keane and Moffit). The former use data from an earlier year, 1980, and the later use the public-use form of the data analyzed herein. Neither study deals with the question of whether the behavior of single mothers differs along the rural-urban residential continuum. If such differences were present in 1984, there is no reason to believe that they would have vanished by today.

Second, the early to mid 1980s was a period of economic uncertainty with much higher unemployment. Then, AFDC and the FSP represented a known and relatively stable safety net policy with expanding or contracting caseloads and associated funding as economic conditions changed. By utilizing data from 1984, we are able to understand responses to cash and in-kind transfers when the programs delivering such transfers were relatively stable and the economic conditions were more uncertain.

In contrast, a study using more recent data from the latter 1990s would take place in an expanding economy with low unemployment and an associated reduction in the need for AFDC and FSP benefits. Given that this long economic expansion stalled, slowed and went into recession, what we learn about similarities in or differences between rural, suburban and urban single mothers' program participation and labor supply decisions of 1984, remain relevant today.

B. Descriptive Analysis

This section describes poverty status, program participation, labor supply and other characteristics of the 1500 single mothers and their households studied herein. Along the way, speculations are made regarding how welfare reform may differentially affect rural, suburban and urban single mother households. All households headed by single mothers are included because most actual or potential welfare recipients reside in such households. They are at risk of poverty if not already poor.

[2] Use of the terms, urban, suburban and rural are not precisely correct due to limitations of the data. The data indicate whether the household resides in a metropolitan or nonmetropolitan area. For metropolitan areas, the data also indicate whether the household resides in the central city or in the balance of the metropolitan area. For ease of exposition, 'urban' and 'suburban' refer to residence in and outside the central cities of metropolitan areas, respectively, and 'rural' refers to residence in nonmetropolitan areas.

Poverty

How single mothers' household incomes relate to the poverty line based upon residence is described in Figure 1. The household income measure used here is the official measure used for determining whether a household is in poverty. It includes cash transfers such as AFDC benefits but excludes in kind transfers such as food stamps. For a family of three, the poverty line was $8,277 in 1984 (*1991 Green Book*, p. 1134). Two striking phenomena stand out in the figure. First, suburban single mother households are much better off than their urban or rural counterparts. Seventy percent of suburban single mother households have incomes of more than twice the poverty line while only 51 and 53 percent of urban and rural households, respectively, reach that relative income range. Second, the distributions of urban and rural single mother households near or below poverty differ substantially, where near poverty is defined as incomes that fall within 101 to 150 percent of the poverty line. More than one third of urban single mother households are at or below the poverty line compared to a quarter of those in rural areas, while those in urban areas have lower near poverty rates (12 percent) compared to their rural counterparts (19 percent).

Program Participation

Program participation status of single mothers in urban, suburban and rural areas is described in Figure 2. At first glance, this figure seems remarkably similar to the previous figure. The two are similar in that virtually the same proportions of urban, suburban and rural households have no program participation (Figure 2) as the proportions who have incomes at or greater than 200 percent of the poverty line (Figure 1). This is not surprising because AFDC is particularly targeted to households whose before-transfer incomes are at or below the poverty line and FSP benefits are targeted to those whose before-transfer incomes plus AFDC benefits are below 130 percent of the poverty line. Once AFDC benefits are added to Food Stamps and other income, total resources are unlikely to reach 200 percent of the poverty line.

The second figure does reveal some interesting differences and similarities in program participation, however. Regardless of where they live, only three percent of single mothers participate only in AFDC. Suburban single mothers' overall program participation is much lower than their urban or rural counterparts. Just less than one-third of suburban single mothers participate in at least one program compared to close to one-half of urban and rural single mother households, respectively.

Although their overall participation is similar, urban and rural single mother households' patterns of participation across programs are quite different. Urban households are more likely to participate in both programs and less likely to participate in only the FSP with 34 and 12 percent participation, respectively. Rural single mothers show a more balanced participation pattern with 24 percent participating in both programs and 19 percent participating only in the FSP.

Labor Supply

The labor supply of urban, suburban and rural single mothers is described in Figure 3. Labor supply is measured as the hours of work per week based upon the week before the interview and grouped into four categories: zero hours of work per week, 1 to

Figure 1: Income of Single Mothers as a Percent of the Poverty Line by Residence

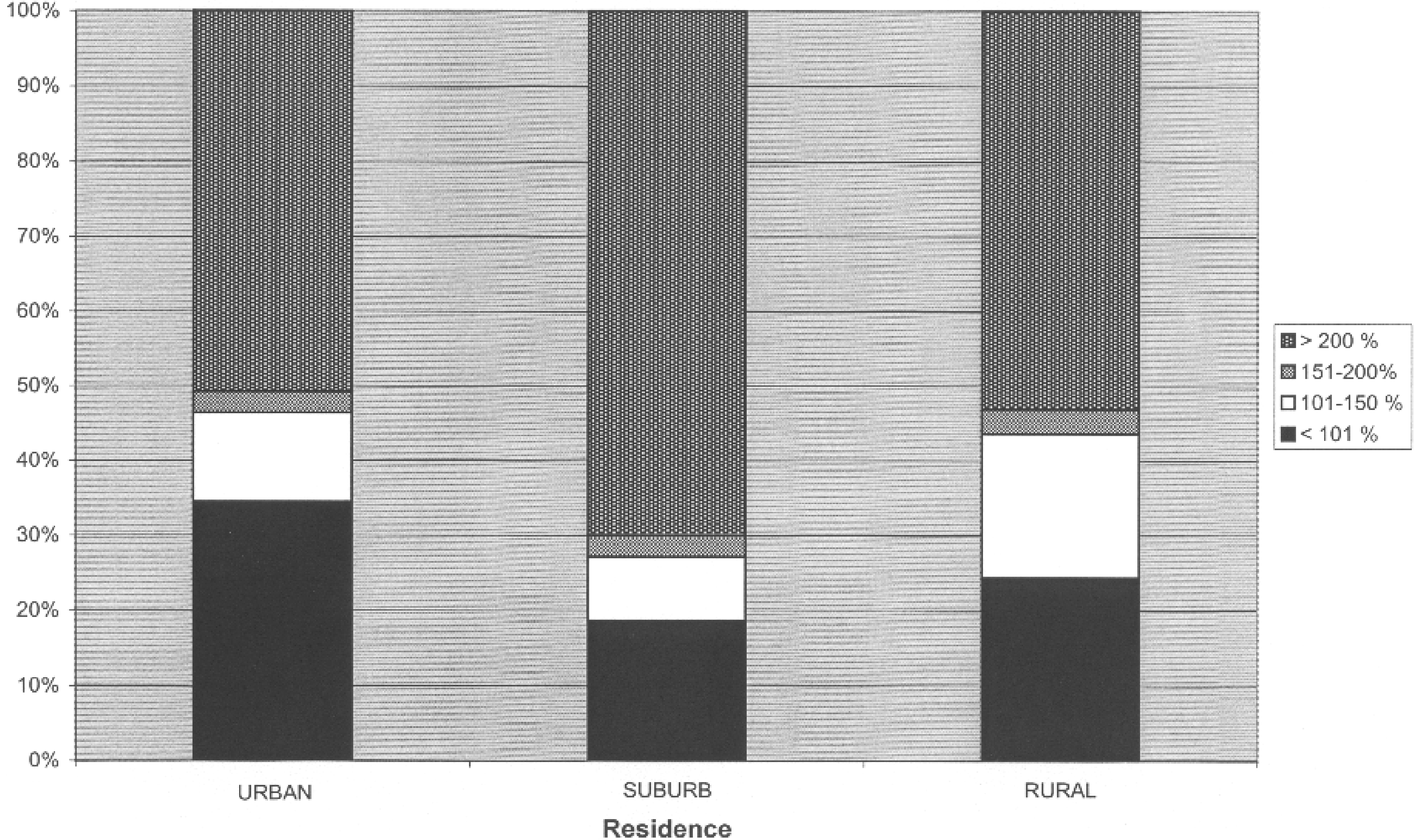


Figure 2: AFDC and FSP Participation of Single Mothers by Residence

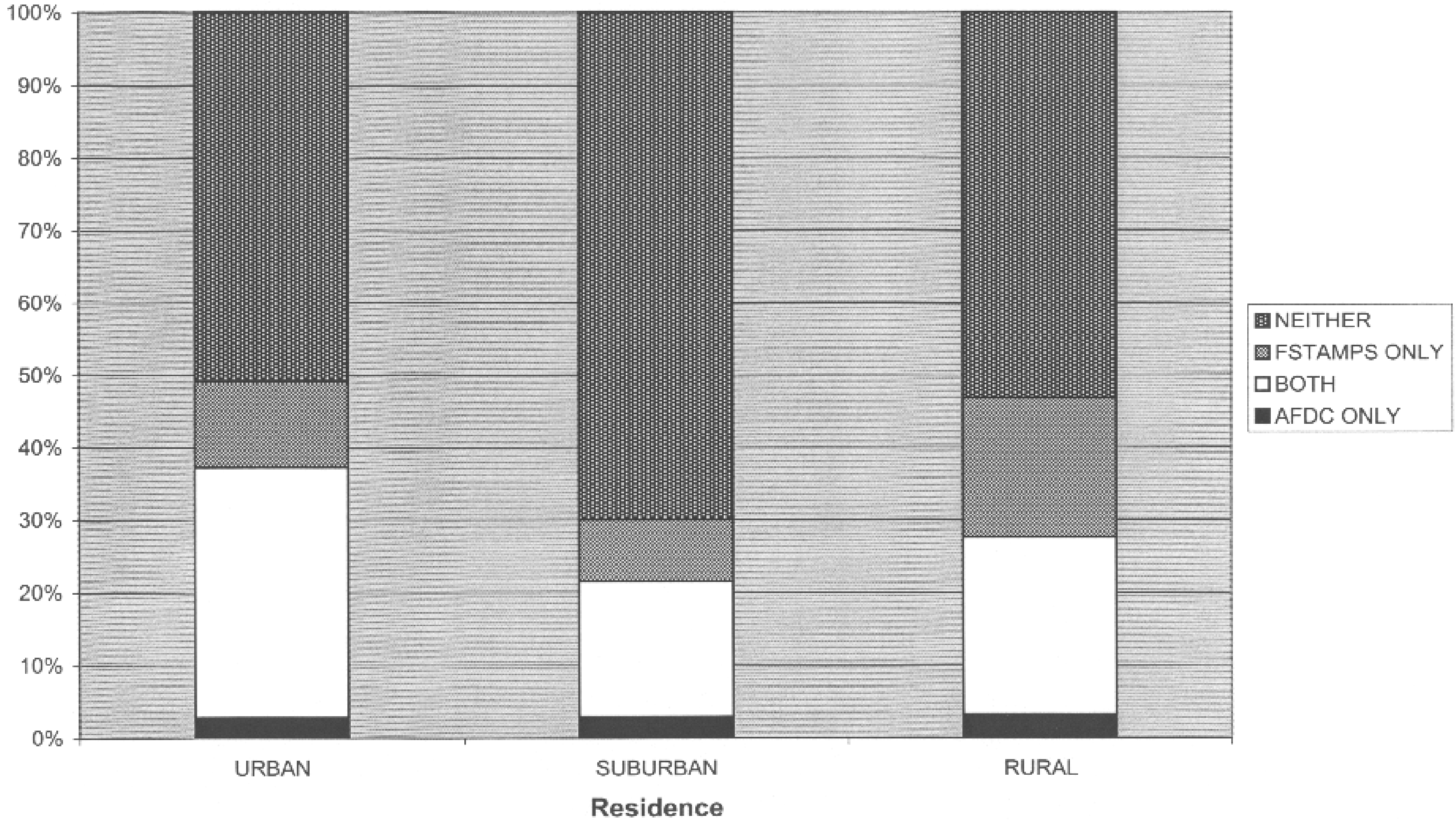
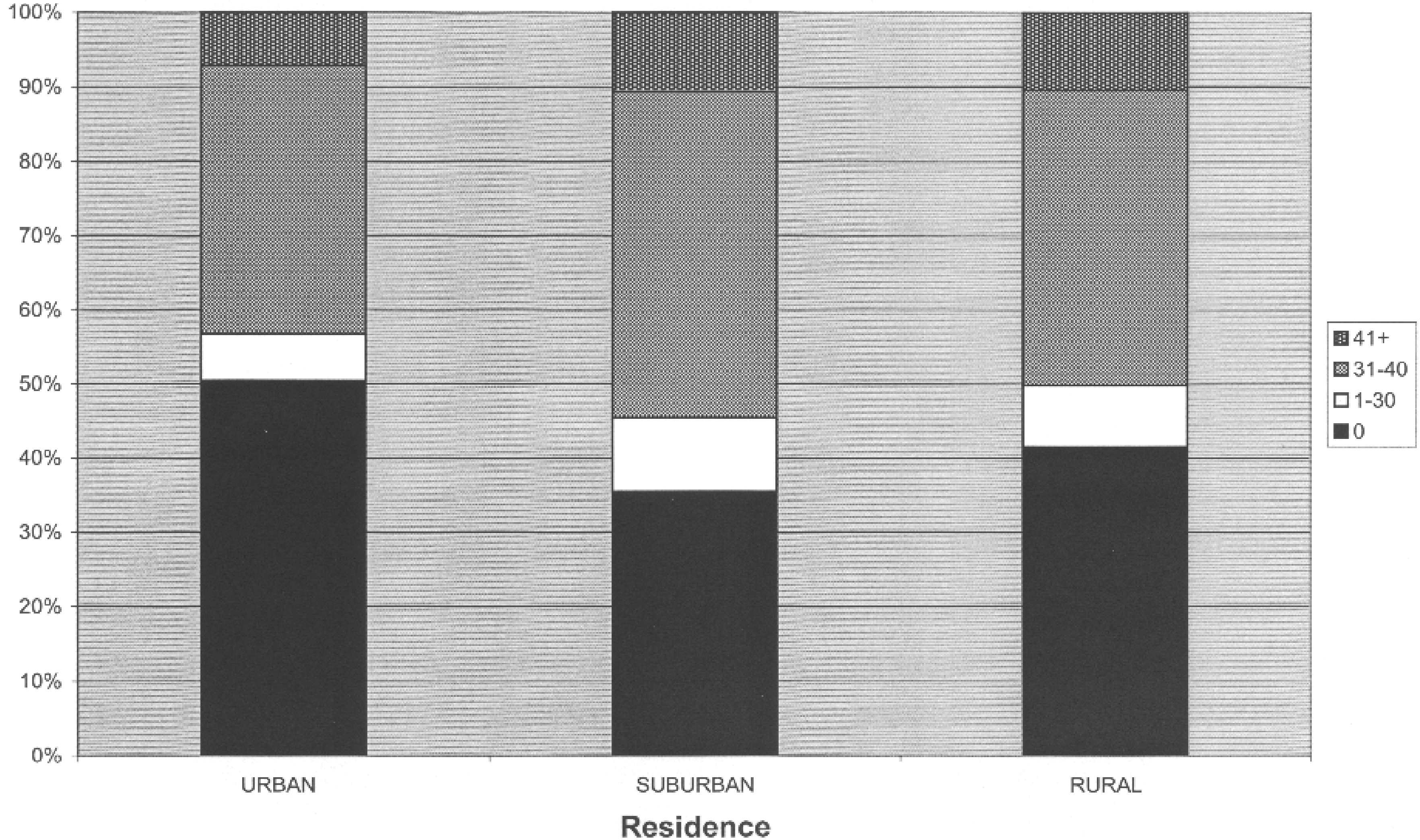


Figure 3: Weekly Hours of Work of Single Mothers by Residence



30 hours per week, 31 to 40 hours per week and 41 or more hours per week. The second category, 1 to 30 hours, is wide because a more finely grained categorization included too few observations. Urban single mothers are least likely to be working and suburban single mothers are most likely to be working. Half of urban single mothers do not work, compared to 35 and 42 percent of suburban and rural single mothers, respectively. If single mothers are working, they usually work near or more than full time. Fifty-five percent of suburban single mothers do so, followed by half of rural single mothers and 43 percent of urban single mothers. A small, but not unimportant group of single mothers work 41 hours a week or more, 7, 11 and 10 percent of urban, suburban and rural single mothers, respectively.

Participation and Labor Supply

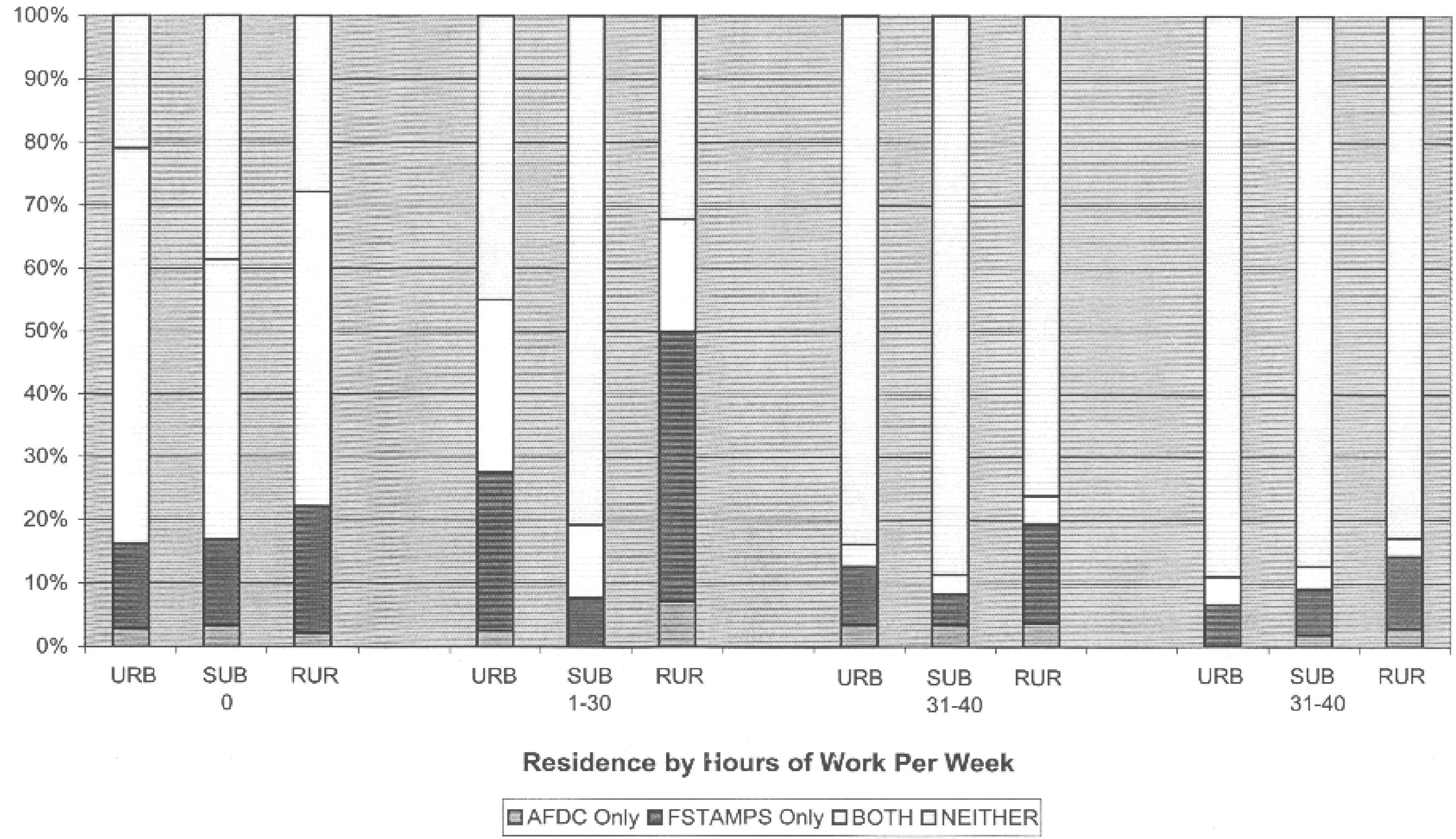
To begin to address the central research question of how AFDC and FSP participation relate to single mothers' labor supply decisions, the weekly hours of work data and the participation data underpinning Figures 2 and 3, respectively, are combined in Figure 4. Each three-bar cluster relates to one of the four labor supply categories from Figure 3. Generally, single mothers who work more hours per week are less likely to participate in either program, regardless of where they live. At the extremes, 79 to 82 percent of nonworking single mothers participate in at least one program, compared to 7 to 11 percent of those working more than full time. Working more than full time clearly does not guarantee lifting all those households out of actual or near poverty. If it did, none of these households would be eligible to receive AFDC or FSP benefits. It is important to keep in mind that roughly one quarter of single mothers who stay home do not need or do not apply for such benefits.

How program participation patterns change as hours of work change for each residential category can be garnered from Figure 4 by focusing on corresponding bars across clusters. Suburban single mothers have less total program participation than their urban and rural counterparts in the first three labor supply categories, dramatically so for those working 1 to 30 hours per week, and are close to last in the final category. Working rural single mothers have a stronger reliance on overall program benefits than working urban single mothers for all three positive work categories.

Strong patterns also emerge when considering AFDC and the FSP separately. In every labor supply category and dramatically in the second category, relatively more rural single mothers and their families rely only on food stamps than those in urban or suburban areas. This suggests these rural households would be somewhat insulated from low state TANF cash assistance program benefits. In contrast, urban female single parent households are generally more reliant on AFDC than those who reside in suburbs or rural areas.

While AFDC participation generally declines with increases in labor supply for all single mother households, it does not vanish, even when the mother is working from 31 hours per week to more than full time. This is of concern because their before-transfer incomes must be at or below the poverty line to receive AFDC benefits. If these working single mothers faced the prospect of welfare reform, they would fall further into poverty

Figure 4: Single Mothers' Program Participation for Given Labor Supply Categories by Urban (URB), Suburban (SUB) and Rural (RUR) Residence



unless they were able to work more hours and/or receive higher wages. Likewise, absent appropriate job skills, employment opportunities and child care, nonworking single mother households would fare even worse given the wide variation in programs across states, strict work requirements and limits on the number of years of eligibility for cash benefits under welfare reform.

Other Characteristics and Statistical Significance

So far, this section has described program participation and labor supply decisions of the rural, suburban and urban single mothers in our sample as well as the poverty status of their households. Next, we explore other characteristics, which may help explain the observed differences in program and labor force participation. We also address whether differences we observe are statistically significant. Definitions and means for the characteristics or variables of interest and for potential explanatory variables are presented in Table 1, as are indicators of significant differences in those variables. (Calculated t-statistics for testing the statistical significance of differences between variable means are presented in Table A1 of the Appendix.)

First, consider differences in program participation, graphed in Figure 3. Table 1 indicates that urban households are most likely to participate in AFDC (APART=0.37), followed by rural (0.27) and then by suburban (0.22) households. Each is significantly higher than the next. The same ordering applies to FSP participation (FPART), with urban, rural and suburban participation proportions of 0.46, 0.44 and 0.27, respectively. Urban and rural FSP participation, however, do not differ significantly.

Even though suburban single mother households are less likely to participate in AFDC, those who do participate receive higher benefits (AFDCBEN) than do participants residing elsewhere. Average AFDC benefits are $328.25, $350.17 and $248.03, for urban, suburban and rural participants, respectively. While average benefits of urban and suburban participants do not statistically differ, both are significantly higher than those of rural participants. This may arise because relatively more urbanized states tend to give more generous AFDC benefits than more rural states. In contrast, rural FSP recipients have significantly higher FSP benefits (FSBEN) than do urban or suburban recipients. Average Food Stamp benefits are $151.14, $137.60 and $168.97 for urban, suburban and rural participating households, respectively. In part, the significant differences between FSP benefits may be explained by the fact that the Food Stamp Program takes AFDC benefits into account when determining how many food stamps a household is eligible to receive per month. That is, when income, including AFDC, is lower, food stamp benefits are higher. Thus, the less generous AFDC benefits of very rural states would result in higher FSP benefits for those states' residents, on average.

Momentarily setting aside labor supply decisions, which affect the level of income from earnings, program participation decisions may be affected by other household resources, such as unearned income and homeownership. Unearned income is defined as all cash income received from any source except AFDC and child support. Home ownership may represent home equity that could be drawn upon currently or in the future. Half of suburban single mothers are homeowners (TENURE), compared to

Table 1: Variable Names, Definitions and Means by Residence

Variable Names	Definitions	Means: Urban (n=644)	Means: Suburb (n=519)	Means: Rural (n=337)
Continuous Variables				
AGE	Mother's age	36.59 [1**]	37.85	37.09
ED	Mother's education	11.30 [1]	11.79 [2*]	11.31
DISABLED	=1 if mother is disabled, 0 otherwise	0.14	0.12	0.14
FAMSIZE	Household size	3.58 [1*]	3.43	3.45
NADULTS	Number of adults	1.55	1.54	1.50
KIDS05	Number of children aged birth to 5	0.65 [1**]	0.49 [2*]	0.61
KIDS610	Number of children aged 6 to 10	0.53	0.49	0.50
KIDS1117	Number of children aged 11 to 17	0.92 [1]	1.00 [2]	0.91
TENURE	=1 if own the residence, 0 otherwise	0.27 [1**]	0.50 [2*]	0.42 [3**]
WDUM	=1 if mother works, 0 otherwise	0.50 [1**]	0.64 [2**]	0.58 [3**]
TOTHRS	Mother's work hours if working	38.22	38.58	37.91
WAGE	Mother's wage if working	6.26 [1]	6.77	6.40
EARNED	Household earned income	754.68 [1**]	1000.55 [2**]	738.73
UNEARNED	Household unearned income	258.46 [1**]	486.26 [2**]	303.77 [3]
CHLDSUPT	=1 if receive child support, 0 otherwise	0.17 [1**]	0.31	0.29 [3**]
CSUPTAMT	Child support amount if received	239.11 [1**]	310.54 [2**]	198.97 [3*]
FPART	=1 if FSP participant, 0 otherwise	0.46 [1**]	0.27 [2**]	0.44
FSBEN	Food stamp benefits if participate	151.14 [1*]	137.60 [2**]	168.42 [3*]
APART	=1 if participate in AFDC, 0 otherwise	0.37 [1**]	0.22 [2*]	0.27 [3**]
AFDCBEN	AFDC benefit if participate	328.25	350.17 [2**]	248.03 [3**]
UNRATE	State unemployment rate	7.45 [1**]	7.71 [2**]	8.14 [3**]
Categorical Variables				
BLACK	=1 if mother is Black, 0 otherwise	0.49 [1**]	0.21	0.24 [3**]
ORACE	=1 if mother is of another nonwhite race, 0 otherwise (omitted category is White)	0.02 [1**]	0.04 [2**]	0.01
SEP	=1 if mother is separated	0.25 [1*]	0.20	0.20 [3*]
DIV	=1 if mother is divorced	0.34 [1**]	0.49	0.51 [3**]
NEVERMAR	=1 if mother never married, 0 otherwise (omitted category is widowed)	0.27 [1**]	0.14	0.12 [3**]
SOUTH	=1 if reside in the South, 0 otherwise	0.35 [1]	0.31 [2**]	0.45 [3**]
MIDWEST	=1 if reside in the Midwest, 0 otherwise	0.27	0.24	0.28
NOREAST	=1 if reside in the Northeast, 0 otherwise (omitted category is West)	0.22	0.23 [2**]	0.13 [3**]

[1]The urban mean is significantly smaller (larger) than the suburban mean is at α= 0.10, one-tailed.
[2]The suburban mean is significantly smaller (larger) than the rural mean at α= 0.10, one-tailed.
[3]The rural mean is significantly smaller (larger) than the urban mean at α=0.10,one-tailed
* α=0.05 **α=0.01
Source: Survey of Income and Program Participation, 1984 Panel, Third Wave

slightly over two-fifths of rural and one-quarter of urban single mothers. Each proportion is significantly greater than the next. Suburban households also have significantly higher average unearned income (UNEARNED = $486.26) than their rural ($303.77) and urban ($258.46) counterparts.

One other household resource, child support, may be partially related to the mother's marital status. Child support awards are most likely to be in place for divorced mothers, next likely for separated mothers and least likely for single mothers who never married. While the proportions of suburban (CHLDSUPT = 0.31) and rural (0.29) households receiving child support are statistically indistinguishable, they are each significantly higher than that of urban households (0.17). Suburban and rural single mothers also have statistically identical marital status distributions. Approximately half of them are divorced (DIV), a fifth are separated (SEP) and a seventh or eighth never married (NEVERMAR). The marital status distribution of urban single mothers stands in stark contrast, with only a third divorced, a quarter separated and just over a quarter that never married. Given that urban single mothers are less likely to be divorced and more than twice as likely to have never married, it is not surprising that they are approximately half as likely to receive child support as their rural and suburban counterparts.

Even though they are least likely to be child support recipients, urban single mothers are in the middle in terms of amount of child support received. Rural child support recipients get the least (CSUPTAMT = $198.97), on average. Urban recipients get significantly more ($239.11) and suburban recipients get significantly more still, $310.54 per month, one average. Adding child support amounts to other unearned income and homeownership, it is clear that suburban households have substantially higher resources available to them than do their urban and rural counterparts, on average. Even without considering labor market factors, this may provide at least a partial explanation for why suburban households have significantly lower rates of AFDC and FSP participation.

Other candidates for explaining program and labor force participation decisions include labor market factors, such as skill levels of potential employees, wages they can earn and the availability of employment opportunities. One measure of the relative availability of employment opportunities, state unemployment rates (UNRATE), differ significantly across residential categories, as indicated in Table 1. The state unemployment rates are highest for rural households (8.14 percent) and lowest for urban households (7.45 percent), much higher than we generally experience today. Interestingly, even though urban single mothers face a stronger labor market (lower unemployment rate), they are significantly less likely to work (WDUM = 0.50) than suburban (0.64) and rural (0.58) single mothers cohorts.

Age and education are often used as indicators of human capital or labor market skills. The average age (AGE) and years of education (ED) of single mothers are of similar magnitudes across the three residential categories as depicted in Table 1. Nonetheless, urban single mothers are significantly younger (AGE = 36.59) than their suburban counterparts (37.85), insignificantly so compared to rural single mothers

(37.09), on average. With respect to educational attainment, rural and urban single mothers also have virtually identical average years of schooling (ED), 11.31 and 11.30, respectively. Suburban single mothers' average education (11.79) is slightly but significantly higher than the educational attainment of other single mothers. If these variables are associated with labor market skills, suburban single mothers may have an advantage in the labor market. That is, they may be more successful in obtaining jobs and/or garnering higher wages, on average. This could help explain why suburban single mothers are significantly more likely to be in the labor force (WDUM) and why, when they work, their wages (WAGE) are slightly higher (though not significantly so) than other working single mothers.

It is interesting to note that average hours worked (TOTHOURS) and average wages earned (WAGE) by working single mothers do not differ significantly across residential categories, with the exception of slightly but significantly lower wages for urban workers. That is, working single mothers generally work close to full time and receive wages between $6.26 and $6.77 per hour, on average, regardless of where they live. If all suburban single mothers worked their average number of hours per week and could earn their average workers' wage throughout the year, they would earn $13,582, which is 167 percent above the poverty line for a family of three. Similarly, urban and rural single mothers would earn $12,441 and $12,616 annually and reach 150 and 152 percent of the poverty line, respectively. Because suburban single mothers are more likely to work, suburban average total household earnings (EARNED = $1,000.55) are significantly higher than those of either urban ($754.68) or rural ($728.73) single mothers. Note that in all cases, total household average earnings (EARNED) are lower than the hypothetical cases because they include zero earnings for those who do not work.

Differences in labor force and program participation may also be explained by a set of household structure characteristics. The set includes household size (FAMSIZE), number of adults (NADULTS) and numbers of children in three age categories: from birth to age five (KIDS05), age six through 10 (KIDS610) and age eleven through 17 (KIDS1117). Although this set reveals quite similar household structures across residential categories, there are some significant differences. Urban households are larger than other households, significantly so when compared to suburban households. They also tend to have younger children. Urban and rural households do not differ in this regard. Specifically, urban single mother households have significantly more preschool children and significantly fewer children in the oldest age category than do suburban households. In turn, suburban households have significantly fewer preschool children and significantly more of the oldest children than do rural households.

Family structure differences could contribute to the lower (higher) labor force participation and associated higher (lower) program participation that we observe for urban (suburban) single mothers. With more preschool children and fewer of the oldest children, urban single mothers would have less day care assistance from older siblings and higher work-related day care expenses than suburban households would, were they to work. This would make safety net programs such as AFDC and the FSP relatively more attractive to urban single mothers. This logical argument, however, does not explain the pattern we observe for rural households. Compared to urban single mothers, they have significantly higher labor force participation, yet similar overall program participation. Some other factors must be in play for rural single mothers and their households. Nonetheless, the advent of welfare reform, with limits on the duration of cash benefits from state TANF programs, means that the availability of safe, affordable child care is crucial for all single mothers to become gainfully employed. The need for such child care is especially pressing for urban single mothers and their children.

Two other sets of characteristics reported in Table 1, region and race, are more difficult to interpret in terms of possible effects on single mothers' labor force and program participation decisions. With respect to the latter, rural residents in the sample are significantly more likely to be found in the South (South = 0.45) and significantly less likely to be found in the Northeast (NOREAST = 0.13) than other single mother households. The sample's urban single mother households are also more likely to reside in the South (0.35) than any other region of the country. The heavily southern orientation of rural households, and to a lesser extent, urban households, raises a concern related to one mentioned earlier. Because Southern states have been more likely to give very low AFDC benefits, we might expect those states to have low TANF benefits and place the strictest limits on the duration of benefits than elsewhere in the country. A countervailing factor may be that the South is growing relatively fast with associated growth in job opportunities. Questions remain, however, as to whether this growth reaches the rural South, in particular, and whether rural and urban single mothers have job skills and available child care to allow them to take part in their growing economy. Thus, the implications of welfare reform for Southern single mothers, especially those in rural areas, is unclear.

With respect to race, Table 1 shows that urban single mothers stand out dramatically from those who reside elsewhere. Almost half of urban single mothers are Black compared to just over a fifth and just under a quarter of suburban and rural single mothers, respectively. The suburban and rural proportions of Blacks are not significantly different. Both, however, are significantly lower than the proportion for urban areas. If there is a Black urban underclass (Wilson), these single mothers may be the most welfare dependent and, therefore, face the most difficulties under welfare reform. The same result will occur if there is racial discrimination in the quality of educational opportunities or in hiring decisions.

C. Summary

This section first discussed the source of data for this study, a cross section from the 1984 SIPP Panel. It then described how and sought explanations for why urban, suburban and rural single mothers' program and labor force participation decisions differ. The analysis revealed how a number of characteristics of single mothers and their households differ depending upon where they live. The analysis also permitted some speculation about how they might fare under welfare reform. In so doing, some clear patterns emerged.

Urban households are most and suburban households are least likely to be in poverty and to participate in AFDC and the FSP. Not unexpectedly, the opposite pattern exists for labor force participation, with urban households least and suburban households most likely to be working. Together, these patterns may be explained by a combination of other characteristics. Urban single mothers are the youngest and least educated, most likely to have never married or to be separated and least likely to be divorced. Their households are least likely to have access to resources other than earnings or program benefits such as, child support awards and amounts, other unearned income and home equity. Urban households are also the largest with the highest numbers of preschool children and tie for last in terms of the number in the oldest children category. For all these characteristics, the situation for suburban households is exactly the opposite, with rural households falling in between.

Rural single mothers' labor force and program participation patterns are more difficult to disentangle. Even though they face the worst labor market conditions (unemployment rates) and have relatively young children, rural single mothers have the second highest labor force attachment. Despite their propensity to work, rural households tie with urban households for highest overall program participation. Further, when they work, rural single mothers have the highest overall program participation and rely most heavily on FSP benefits and least on AFDC benefits than working single mothers residing elsewhere, even when they work more than full time. The latter may be explained by their predominant location in the South. The former, higher overall program participation by working rural single mothers, is more difficult to understand.

Understanding what role all these characteristics play in determining program participation and labor supply decisions of urban, suburban and rural single parents requires results from multivariate analysis rather than the univariate analyses in this section. The multivariate econometric analyses are described, reported and discussed in section IV. First, the theoretical framework that underpins the econometric model is developed in the following section.

III. THEORETICAL FRAMEWORK

The microeconomic theory of utility maximization provides the foundation for this study of single mothers' labor supply and program participation decisions. Beginning with a simple model of labor supply, assume no cash or in-kind transfer programs such as AFDC or the FSP. Next, the possibility of AFDC participation and benefits are added. Then, replace AFDC with the possibility of FSP participation and benefits alone. Finally, we address the actual situation single mothers' face, the possibility of participating in either or both programs as well as the labor force. In each case, from the simplest to the most complex, the focus is on how single mothers' budget constraints and, in turn, labor supply decisions may be affected by the absence or presence of AFDC and/or FSP options. Section IV concludes by highlighting what this theoretical framework implies for the structure of the multivariate econometric analysis.

In the absence of any transfer programs, the usual model of labor supply is based on maximizing utility, $U(Y, H)$, subject to the budget constraint, $Y = wH + N$, where, Y, w and H are total income, the wage rate and hours of work, respectively. N is nonwage or unearned income, including child support. Income and hours of work are assumed to affect utility positively and negatively, respectively. The budget constraint for a representative single mother is line AB with slope –w in Figure 5 (replicated from Fraker and Moffitt, p. 29). The vertical distance from zero hours of work to point A reflects her unearned income (N). Under utility maximization, the mother chooses an hours/income combination from among those on AB. If wages or unearned income change, the budget constraint changes and her utility maximizing choice would likely change. Thus, wages and unearned income are the arguments of the labor supply function,

(1) $H = f(w, N)$.

With no transfer program options, as in (1), the effect of unearned income on hours of work is negative if leisure is a normal good.

Following Graham and Beller's framework, now add the possibility of participation in AFDC. The somewhat complex AFDC benefit structure is described in detail in Appendix B. For ease of exposition, define program benefits more simply as

(2) $B_A = G_A - t_A wH - r_A N$.

In (2), G_A is the guaranteed benefit if the household has no other income and t_A and r_A are the AFDC tax rates on earnings and unearned income, respectively. From (2), define

(3) $G'_A = G_A - r_A N$

as the benefit she would receive if she did not work.

Given AFDC, our representative mother's budget constraint is KLB in Figure 5. The vertical distance from zero hours to point K is $N + G'_A$. The slope of the budget constraint between points K and L, $-w(1 - t_A)$, is flatter than between L and B (-w), because the AFDC program reduces benefits when earnings increase from zero up to point L. That point is often referred to as the break-even point, where the mother's earnings are exactly high enough to reduce her potential AFDC benefits to zero.

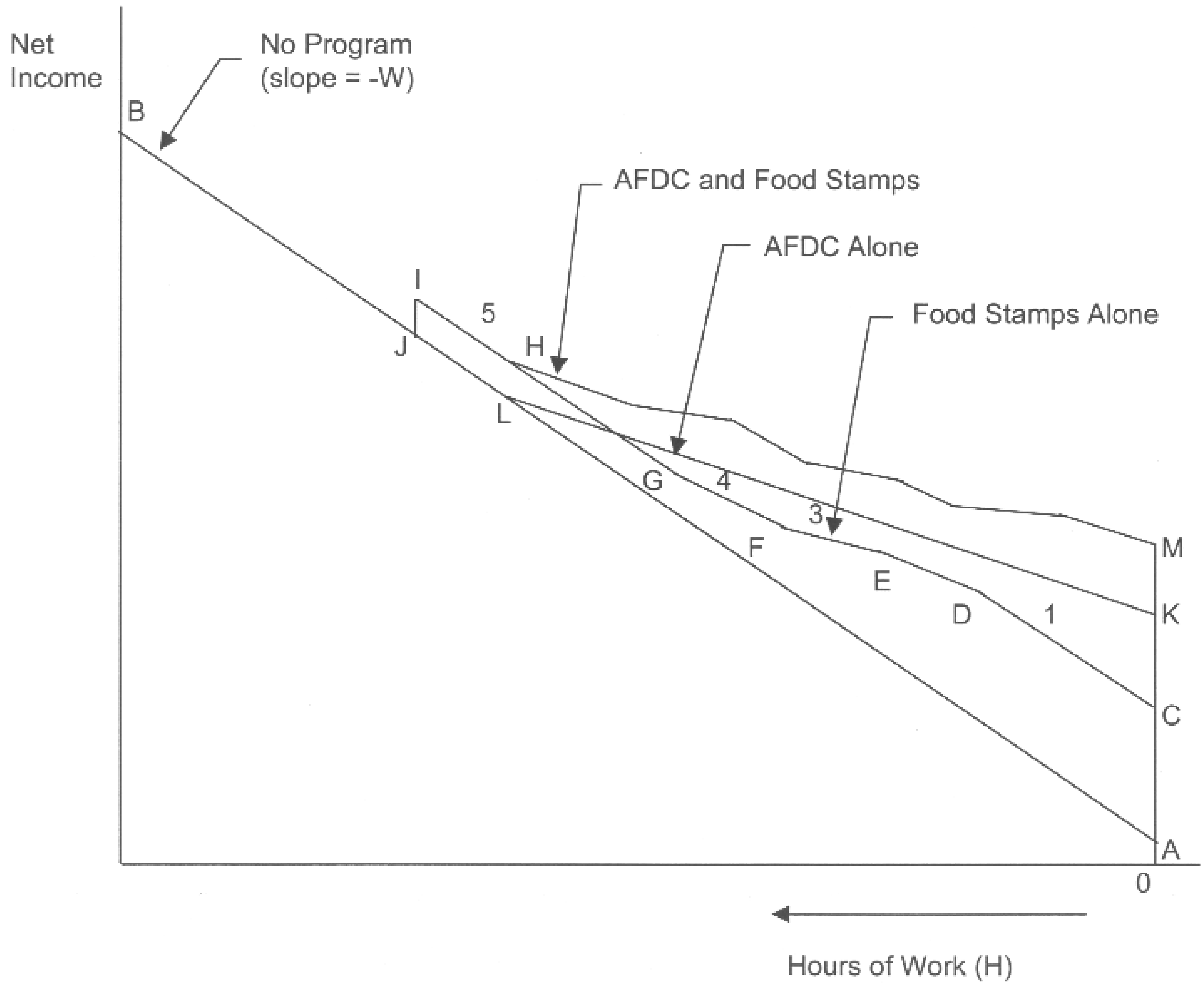
As was the case in (1), budget constraint elements are arguments of the labor supply function when AFDC participation and benefits are possible. Because the mother also chooses whether to participate in AFDC, the labor supply function differs from (1) as follows:

(4) $H = f(w(1 - t_A P_A), N + G'_A P_A)$.

P_A equals 1 if the mother chooses to participate in AFDC and equals 0 if she does not. The first term of (4), is the net wage associated with earnings. That is, if the mother doesn't participate in AFDC (P_A=0), her net wage is the market wage, w.[3] If she

[3] Here we ignore additional complications associated with the income tax system.

FIGURE 5: Representative Budget Constraints Under Food Stamps and AFDC



Source: T. Fraker and R. Moffitt, "The Effect of Food Stamps on Labor Supply", Journal of Public Economics 3 (No. 1, Feb. 1988), p. 29.

participates (P_A=1), her net wage, $w(1-t_A)$, is less than the market wage due to the program's indirect tax rate on earnings, t_A. The second term of (4) indicates that her labor supply decision is affected by her unearned income (N) if she doesn't participate in AFDC or that plus her potential maximum benefit ($N + G'_A$) if she does participate.

AFDC participation is endogenous and depends on whether the household would maximize utility on or off the program. By substituting (4) into the utility function, the resulting indirect utility function (V), can be used to describe the AFDC participation decision as follows:

(5) $P_A^* = V(w(1 - t_A), N + G_A') - V(w, N)$ and

(6) $P_A = 1$ if $P_A^* > 0$ or

$P_A = 0$ if $P_A^* \leq 0$.

That is, if indirect utility is greater on the program $V(w(1 - t_A), N + G_A')$ than off the program $V(w, N)$, P_A^* is greater than zero and household participates in AFDC.

Now, replace AFDC with the possibility of FSP participation and benefits. As shown in detail in Appendix C, the FSP benefit calculation is quite complex. A more straightforward version is

(7) $B_F = G_F - r_F(1 - e_F)wH - r_F(N - D_F - S_F)$.

Here, G_F is the guaranteed FSP benefit for a household with no other resources, r_F is the FSP tax applied to both earned and unearned income and e_F is the earned income disregard. The disregard serves to protect portion e_F of earnings from the FSP tax. In the last term of (7), D_F and S_F are the standard and shelter deductions, respectively. The deduction for shelter expenses assists households with high rental expenses relative to their incomes. Much simplified in (7), the actual shelter deduction is capped, declines with income at rate t_S, and phases out when income is sufficiently high. Although not shown in (7), the program also provides a minimum benefit for one- and two-person households, who just barely meet the income eligibility criteria, even though (7) would yield a benefit below that minimum. More detailed specifications of the minimum benefit and shelter deduction can be found in Appendix C.

Substituting t_F for $r_F(1 - e_F)$ in (7) yields,

(8) $B_F = G_F - t_FwH - r_F(N - D_F - S_F)$

and the FSP guaranteed benefit at zero hours of work is

(9) $G'_F = G_F - r_F(N - D_F - S_F)$.

Equations (8) and (9) are similar in form to their AFDC counterparts, (2) and (3), respectively. Although the formulae appear very similar, our representative single mother's AFDC and FSP budget constraints are strikingly different. Her actual food stamp constraint, CDEFGIJB in Figure 5, has a series of kinks and a notch (Fraker and Moffit, p.28). The vertical distance from zero hours to C is $N + G'_F$. The kinks and segments with different slopes arise from specifics of the benefit structure, as follows: (1) For the first segment, between C and D, the standard deduction applies and earnings are not taxed. The slope of this segment is, therefore, -w. (2) At D, the standard deduction is exhausted and the earnings tax applies up to point E. This segment's slope is $-w(1 - t_F)$. (3) Between points E and F the shelter deduction is phased out at rate t_S to yield an even flatter slope for this segment, $-w(1 - t_F)(1 + t_S)$. (4) For the segment from F to G, the mother's constraint again reflects only the earnings tax with slope $-w(1 - t_F)$. (5) All along the final segment, from point G to I, her household is only eligible for the minimum benefit. Hence, her earnings are not taxed and the slope of the segment is –w. The notch at I is generated because her household is no longer eligible even for the minimum food stamp benefit.

As was the case for AFDC in (4), the food stamp budget constraint elements are arguments of the labor supply function when FSP participation and benefits are possible, such that

(10) $H = f(w(1 - t_F P_F), N + G'_F P_F)$.[4]

In (10) the endogenous variable P_F indicates FSP participation, the first argument represents net wages and the second, available resources at zero hours of work. Defined in parallel to the AFDC participation decision framework (5) and (6), the FSP decision framework is:

(11) $P_F^* = V(w(1 - t_F), N + G'_F) - V(w, N)$ and

(12) $P_F = 1$ if $P_F^* > 0$ or

$P_F = 0$ if $P_F^* \leq 0$.

The single mother participates in the FSP if the indirect utility she would attain on the program is greater than her indirect utility off the program.

We now have the building blocks for our situation, where households may participate in AFDC and/or the FSP. As one might expect, the model is quite complex. A major complication is that AFDC benefits are included as unearned income for the purpose of calculating FSP benefits. AFDC benefits, however, are not affected by the FSP. Therefore, only the benefit formula for the FSP in (8) is modified as follows:

(13) $B_F = G_F - t_F wH - r_F(N - D_F - S_F + B_A)$.

At zero hours of work, the food stamp guarantee is:

[4] The careful reader will note that the first argument of the labor supply function, net wage, actually is more complicated over a range where the shelter deduction is phased out ($w(1 - t_F)(1 + t_S)$). The data do not include rental expense, so each household's relevant phase-out income range was impossible to determine. Therefore, the shelter deduction is assumed fixed at the maximum here and throughout the econometric analysis. For households with actual, though unobserved, low rent to income ratios, calculated FSP benefits will be somewhat higher than the program would provide.

$$(14) \quad G''_F = G_F - r_F(N - D_F - S_F + G'_A).$$

From (9), (14) can be rewritten as:

$$(15) \quad G''_F = G'_F - r_F G'_A.$$

The budget constraint, when participation and benefits from AFDC and the FSP are possible, also has kinks and a notch. A constraint for our representative single mother may look like MHIJB in Figure 5. The constraint indicated is suggestive only because exact kink locations depend upon complex linkages between the programs. We know, however, that the combination of programs yields at least one more kink (Fraker and Moffitt, p. 29) and that some of the segment slopes differ from those for either program alone. As can be seen clearly in (15) the food stamp tax, r_F, is applied directly to AFDC benefits at zero hours of work. The vertical distance from zero hours of work to M is $N + G'_A + G''_F$. At M and beyond, food stamp benefits are lower than they would be if AFDC benefits were not available. While AFDC benefits are not changed by the presence of the FSP, the effect of AFDC's tax rates are modified by r_F through (13) to (2).

Two general aspects of the joint AFDC and FSP constraint merit comment. First, along the portion from M to H, benefits from both programs are available to our single mother. Second, as her earnings increase beyond H and up to the notch at IJ, only food stamps are available. The food-stamp-only segment arises because AFDC eligibility ceases when income is higher than 100 percent of the poverty line and FSP benefits generally continue up to 130 percent of the poverty line.

Using (3) and (15), the labor supply function that incorporates the possibilities of AFDC and FSP participation is

$$(16) \quad H = f(w(1 - t_A P_A - t_F P_F), N + G'_A P_A + G''_F P_F).$$

As in (4) and (10), (16) includes participation indicators and is also a function of net wages and available resources (unearned plus program benefits) at zero hours of work. Equation (16) is the general case of the three other hours equations derived above. If the household participates in neither program ($P_A = P_F = 0$), participates only in AFDC ($P_A = 1$ and $P_F = 0$) or participates only in the FSP ($P_A = 0$ and $P_F = 1$), (16) yields (1), (4) or (10), respectively. In this labor supply function, (16), w, t_A, t_F, N, G'_A, G'_F, and r_F are exogenous, but P_A and P_F are not.

Using (5), (11) and (15), the two endogenous program participation decisions together require single mothers to compare four indirect utility possibilities:

$$(17a) \quad V(w(1 - t_A - t_F), N + G'_A + G''_F)$$

for participation in both programs;

$$(17b) \quad V(w(1 - t_F), N + G'_F)$$

for participation in the FSP only;

(17c) $V(w(1 - t_A), N + G_A')$

for participation in AFDC only and

(17d) $V(w, N)$

for no program participation.

They choose the participation combination that allows them to attain the highest indirect utility.

Unlike the usual, simple model of utility maximization, where the individual chooses one hour/income combination from those on *one* budget constraint, our single mothers' choose one work hours/income combination from those on *four* budget constraints. As we observed in the descriptive section, there are households that participate only in AFDC although they are categorically eligible for food stamps. Likewise, there are households that participate only in the FSP even though some of them are also eligible for AFDC. Finally, some households participate in neither program even though they are eligible for both. That is, some mothers choose an hours/income point from K to just before L on the AFDC alone constraint, from C to just before H on the food stamp alone constraint, or from A to L on the no program constraint in Figure 5. They make these choices even though their households would have more total resources if they participated in both programs.

At first glance, this seems nonsensical to most economists. They would argue, at least initially, that MHIJB in Figure 5 is the only appropriate constraint because it includes benefits from both programs and yields the highest level of total resources. There are several possible (economic) explanations for the observed phenomena, nonparticipation of eligible households. One is stigma associated with welfare program participation (Moffitt (1983), Ranney and Kushman, and Fraker and Moffitt). That is, mothers may not like receiving or having others know they receive welfare benefits. For example, during the time frame of our study, 1984, food stamp recipients could not hide their recipiency status from anyone in the grocery store check-out line as they ripped stamps out of their coupon books to pay for their food. This source of stigma for food stamp recipients should be greatly reduced or eliminated by the advent of electronic benefits transfer (EBT), mandated and soon to be in place nationwide. With nation-wide EBT, all food stamp households will receive a debit card that is credited with their food "stamp" allotment periodically. That card, rather than stamps, will be used for food purchases in stores.

Other reasons for nonparticipation include, lack of knowledge regarding eligibility or other program regulations, incorrect denial of eligibility by welfare offices and transactions costs associated with obtaining and subsequently re-certifying eligibility.

Time and money costs associated with travelling to and from the welfare office, filling out forms, obtaining proper documentation and dealing with welfare office staff are all transactions costs.

To account for stigma, transactions cost and other unobserved or unobservable factors affecting participation, we follow Fraker and Moffitt and define ϕ_A and ϕ_F as capturing these factors and modify (5) and (11) accordingly, to build the two-program participation framework.

(18) $P_A^* = V(w(1 - t_A), N + G_A') - V(w, N) - \phi_A$ and

(19) $P_F^* = V(w(1 - t_F), N + G'_F) - V(w, N) - \phi_F$, where

$P_A = 1$ if $P_A^* > 0$ or $P_A = 0$ if $P_A^* \leq 0$ and

$P_F = 1$ if $P_F^* > 0$ or $P_F = 0$ if $P_F^* \leq 0$.

If ϕ_A or ϕ_F is large, a larger utility gain from that program will be required for the mother to choose to participate. Together, (18) and (19) reflect the four participation possibilities: participation in one program, the other program, both programs and neither program.

These participation functions and the labor supply function, (16), constitute the microeconomic framework for program participation and labor supply decisions of single mothers. That framework reveals the following: Labor supply decisions depend on endogenous program participation decisions, net wages (market wages or less, depending upon whether program tax rates apply), and total unearned resources (unearned income plus total applicable program benefits defined at zero hours of work). The latter two, net wages and total unearned resources also play a role in AFDC and FSP program participation decisions. After accounting for possible unobserved stigma, transaction costs, or other unobserved factors, program participation depends upon comparisons of utility gains on and off the programs. To the extent possible, key aspects of this theoretical framework will be incorporated directly into the multivariate econometric model developed next.

IV. ECONOMETRIC MODEL

A. Introduction

The endogeneity of the program participation decisions and two other econometric problems must be addressed before achieving the primary objective of accurately estimating the determinants of female single parents' hours of work given the availability of AFDC and FSP participation and benefits. The second econometric problem relates to possible correlation between the error terms of the participation decisions. The third is that, wages, a necessary variable in the participation and hours equations, are not observed for women who are not working. Solutions to those problems, empirical specifications and estimation results follow a brief review of three prior studies that guide development of our econometric model.

B. Literature Review

The three guiding studies, one by Fraker and Moffitt (F and M), one by Keane and Moffitt (K and M) and the other by Graham and Beller (G and B), have been referred to in previous sections. Each merits further discussion here, because each addresses how two endogenous participation or participation-like decisions affect labor supply of single mothers in the U.S. F and M and K and M address the relationship between endogenous FSP and AFDC program participation decisions and labor supply. Both papers jointly estimate a highly complex three-equation model with bivariate selection. The bivariate selection aspect arises because eligible household may and do choose nonparticipation in either or both AFDC and the FSP and because unobserved characteristics associated with those participation choices are likely to be negatively correlated with unobserved factors affecting labor supply. F and M estimate reduced form equations using data from 1980. K and M do structural modeling with simulation estimation methods using the 1984 SIPP Panel. To make their models more tractable, F and M and K and M categorize hours of work into three discrete categories: zero hours, part-time and full-time work.

Graham and Beller estimate a continuous hours of work function, with endogenous AFDC participation and child support receipt. Like F and M and K and M, they account for possible bivariate selection and correlations between the AFDC and child support receipt equations, respectively, and hours of work. However, they do so quite differently. They extend sample selection correction procedures to the bivariate selection case where labor supply is observed for all, not just the "selected" sample. Because their approach is much more tractable than F and M's and K and M's and because it allows estimation of a continuous labor supply function, rather than labor supply categories, G and B's approach is extended for the analysis herein.

C. Predicting Wages

Because wages play such important roles in the hours of work and program participation decisions, we impute wages (WHAT) for our single mothers based upon the wages earned by working single mothers. We do so by applying Heckman's (1979) two-step sample selection bias correction procedure to each rural, suburban and urban subsample.

The first step is to utilize all observations in the subsample to estimate a probit equation for whether a wage is observed. The dependent variable equals one if wages are observed and zero if not. The probit estimates are used to calculate the inverse of the Mill's ratio (LAMBDA) for each observation. Those calculated LAMBDAS are included as an auxiliary independent variable in the second step ordinary least squares wage regression using only subsample observations where wages are observed.

The LAMBDAS are necessary to correct for possible bias associated with unobserved characteristics that systematically affect the probability of observing a wage and the value of the wage. In other words, the error terms of the two equations may be correlated. The two-step Heckman procedure model results are presented in Appendix D in tables D1, D2 and D3 for the rural, suburban and urban subsamples, respectively. As shown in those tables, all three LAMBDA coefficients are negative, significantly so for the rural subsample, indicating a negative correlation between unobserved factors in the two equations. The LAMBDAS also correct for possible selection bias in the other coefficients of the wage equation. We use the (unbiased) coefficients from the second step wage equations (excluding LAMBDAS) presented in those appendix tables to impute wages for all single mothers in respective subsample.

It should be noted that Fraker and Moffitt criticize the use of this two-step Heckman technique for predicting wages on two grounds. First, they argue that the procedure will not yield consistent model estimates whenever the predicted values appear in the main (hours) equation nonlinearly, as is the case in their model. This is not a problem in our case because wages do appear linearly in our hours equation, as will be seen shortly. Second, F and M and K and M argue as have Moffitt (1984) and others, that wages are a function of hours of work, specifically, part-time wages are generally lower than full-time wages. This implies that the no-program budget constraint, AB in Figure 5, doesn't have a constant slope (-w) as depicted. Their method of handling this problem, limiting themselves to three labor supply categories, is unsatisfactory if one is interested in a continuous range of labor supply possibilities. Furthermore, the correction they use, based on Wales and Woodland, requires the undesirable restriction of independence between the error terms of the wage and structural labor supply functions. Therefore, we estimate and then predict wages for all single mothers as do G and B, utilizing the Heckman procedure described above and the specification and estimates in Appendix D that do not include hours as an explanatory variable.[5]

D. Program Participation Equations

Following Graham and Beller's modeling approach, we linearize the theoretical representations of AFDC participation (18) and FSP participation (19) around wages and nonwage income, including potential program benefits. This yields our empirical specifications for participation in the two programs P_A and P_F:

(20) $P_A = a_0 + a_1 X_A + a_2 N + a_3 G'_A + a_4(-wt_A) + e_A$ and

(21) $P_F = b_0 + b_1 X_F + b_2 N + b_3 G'_F + b_4(-wt_F) + e_F,$

In (20) and (21), X_A and X_F are vectors of demographic variables; N is unearned income including child support; G'_A and G'_F are household AFDC and FSP benefits at zero hours of work, respectively; $-wt_A$ *and* $-wt_F$ are the differences between wages on and off AFDC and the FSP,[6] respectively; *a's* and *b's* are coefficients, and e_A and e_F are normally distributed error terms.

If the error terms of (20) and (21) are uncorrelated, these equations can be estimated with separate maximum likelihood probits. That is unlikely, however, because we have subsumed unobserved stigma, transactions costs and other factors associated with AFDC and FSP participation into those error terms. The correlation between e_A and

[5] It is also interesting to note that K and M design a two-step procedure which estimates the wage equation in the first stage and uses estimated wages in the second stage simulated moments (MSM) estimation of the choices.

[6] The careful reader will note here that by linearizing (18) and (19), which are differences in indirect utility from being on and off AFDC, and food stamps respectively, our "wage terms" shift from $(1-t_A)$ and w to the difference between them. That is, $w(1-A_{ta})-w$ becomes $-w_{ta}$. The logic from $-w_{tF}$ follows directly.

e_F is likely to be positive, significantly so, as Fraker and Moffitt found. Thus, joint estimation of the participation equations utilizing the bivariate probit model, which allows for correlation between the error terms, is appropriate for our analysis.

E. Hours Equation

While the participation decisions are of interest on their own, they also need to be estimated to correct for their endogeneity in the hours model. As the first step toward specifying the empirical hours equation and the endogeneity correction, we draw from its theoretical counterpart (16) replicated below,

$$(16) \quad H = f(w(1 - t_A P_A - t_F P_F),\ N + G'_A P_A + G''_F P_F)\ .$$

The first argument of (16) is an exogenous variable, net wage: Take home wages after program taxes on earnings (t_A *and* t_F) have been applied to gross wages. The second argument, though apparently simple, is complex. Recall from (3) that G'_A is a function of G_A, N, and r_A while G''_F, from (14), is a function of exogenous variables including program guarantees (G_A , G_F) unearned income (N), and program taxes on unearned income (r_A , r_F). Following the derivation of the single-program hours functions, (3) and (10), (16) translates into an empirical hours function:

$$(22a) \quad H = c_0 + c_1 X_{11} + c_2\, w(1 - t_{APA} - t_F P_F) + c_z(N + G'_A - G''_F P_F\ ) + u\ ,$$ [7]

where, c's are parameters; X_H is a vector of demographic variables; the remaining variables are as specified in (16); and u is a normally distributed error term. To make the structural interactions between the two programs clear, rewrite (22a) as

$$(22b) \quad H = c_0 + c_1 X_H + c_2\, w(1 - t_A P_A - t_F P_F) + c_3 N + c_4 G'_A P_A + c_5(G'_F - r_F G'_A P_A\ ) P_F + u\ .$$

Given (22a), (22b) implies $C_3 = C_4 = C_5$. This hypothesis can be viewed as a test of whether these program interactions are important in the labor supply decisions of single mothers. This revision also highlights the importance of the endogenous participation decisions. Now, if P_A and P_F were exogenous; estimation of (22b) would be straightforward.

Given their endogeneity, direct estimation of (22b) would generate biased results unless $E(u|e_A) = 0$ and $E(u|e_F) = 0$. That is, unless the covariances (or correlations) between the respective error terms are zero. That is unlikely. Unobserved factors that affect hours of work also are likely to affect AFDC and FSP participation, respectively.

[7] Recall from (20) and (21) that N is defined to include child support. Graham and Beller make a convincing theoretical and empirical case for the endogeneity of child support receipt in the hours equation. Even so, given our focus here on the role of AFDC and the FSP on work hours, we do not attempt to account for this additional source of endogeneity for fear of the model becoming too cumbersome, intractable and difficult to estimate.

As expected, Fraker and Moffitt and Keane and Moffitt found significant negative correlations between hours and FSP participation and between hours and AFDC participation error terms.

Graham and Beller, with their similar case where hours of work are a function of two endogenous choices (possibly correlated selection rules), extend the procedure of Barnow, Cain and Goldberger to obtain consistent estimates for the hours equation. Applying Graham and Beller's procedure (pp. 679-680), the first step involves bivariate probit estimation of the participation equations, (20) and (21) above, and using the coefficient (*a* and *b*) and error term correlation (*rho*) estimates to calculate:

(23) $\lambda_{AA} = z_A \phi(z_A a X_A) F[(z_F b X_F - rho^* z_A a X_A)/sqr(1-rho^2)]/G(..)$[8] and

(24) $\lambda_{FF} = z_F \phi(z_F b X_F) F[(z_A a X_A - rho^* z_F b X_F)/sqr(1-rho^2)]/G(..)$,

where $z_A = (2P_A - 1)$, $z_F = (2P_F - 1)$, $rho^* = z_A z_F rho$, ϕ is the univariate standard normal density, F is the univariate standard normal cumulative distribution, and G is the bivariate cumulative distribution, evaluated at $(z_A a X_A, z_F b X_F)$ given *rho*. Note that these calculated values have double subscripts to indicate their calculation from bivariate probit estimates. If *rho* = 0, these revert to the usual sample selection correction factors derived from single probit estimates, and would be subscripted with single rather than double values.

The second step involves adding the values calculated in the first step to the hours equation as explanatory variables. Thus, the equation to be estimated is:

(25) $$H = c_0 + c_1 X + c_2 w(1 - t_A P_A - t_F P_F) + c_3 N + c_4 G'_A P_A + c_5(G'_F - r_F G'_A P_A) P_F + a_6 \lambda_{AA} + a_7 \lambda_{FF} + u,$$

This equation corrects for the endogeneity of the participation decisions (selection rules).

F. Estimation Results

Given nine estimated equations (two participation equations and one hours equation for single mothers residing in each of three areas, rural, suburban and urban), presentation and discussion of the results are organized as follows: (1) Details of estimation results for each area, including variable means, are presented in Appendix E. (2) All nine equations are summarized in Table 2. (3) Utilizing the results in Table 2, we discuss program participation first, followed by hours of work. In both cases we compare patterns of signs, magnitudes and significance for rural, suburban and urban single mothers.

[8] Equations (23) and (24) do not exactly correspond to those in Graham and Beller's (12) and (13) on page 678. A careful reading of Maddala's and Greene's textbooks and Greene's LIMDEP econometric program on line manual suggests that a correction to Graham and Beller's equations is necessary. In particular the term $1/sqr(1-rho^2)$ inside $F[.]$ of (23) and (24) is missing in each of Graham and Beller's equations.

Table 2: Bivariate Probit Coefficient Estimates for AFDC and Food Stamp Program Participation and Least Squares Coefficient Estimates for Total Hours Worked by Rural, Suburban and Urban Single Mothers, Respectively

Variable[1]	Rural AFDC[2]	Rural Food Stamp	Rural Hours	Suburban AFDC	Suburban Food Stamp	Suburban Hours	Urban AFDC	Urban Food Stamp	Urban Hours
CONSTANT	3.0676 *	3.2844	0.5976	0.8861	3.3653 ***	9.4308 *	-1.0204	0.0124	9.9509 **
GPRIMEA	-787.1502	--	--	2078.2851 **	--	--	2179.4242 ***	--	--
GPRIMEF	--	2230.3927	--	--	2363.6036	--	--	2805.7814	--
UNEARN	-3165.9108 ***	-397.4738	-0.0160 ***	-959.1695 ***	-570.8627	-0.0078 ***	-1473.7397 ***	-445.2456	-0.0057 ***
NEGWTSA	62.1858 ***	--	--	57.6635 ***	--	--	52.1926 ***	--	--
NEGWTSF	--	269.7836	--	--	350.3792 ***	--	--	100.9289 *	--
KIDS05	69.0117 ***	30.6037	2.4120	40.6917 *	22.8290	-1.0896	37.9591 ***	38.1310 ***	-1.6281
KIDS610	21.1237	23.5615	1.9793	7.6162	24.7486	-1.2091	26.2000 ***	22.5559 *	-1.1799
KIDS1117	41.5289 **	12.5255	4.2938 ***	16.7674	27.9344	-0.2634	8.3034	7.8913	0.1745
NADULTS	37.1710 **	-9.8927	2.4040 **	22.0586 *	-26.2405	1.3188	17.3722 *	-14.7629	3.2113 ***
DIV	-0.2896	0.1438	4.8777 *	0.3117	0.3675	8.5506 ***	0.4472	0.0645	9.7297 ***
SEP	0.1732	0.2737	2.8839	0.6671	0.5521	6.6275 ***	0.2568	0.0865	5.2055 ***
NEVERMAR	0.7818	0.3677	2.8967	0.3436	0.6932 *	4.1019	0.5477 *	0.4626 *	5.8634 ***
BLACK	-0.0664	0.3112	-1.8064	-0.2506	-0.2994	-0.2992	0.5698 ***	0.3559 **	0.2994
ORACE	--	--	--	0.0535	-0.5402	5.7327	-1.7049	-1.0045	13.3497
MIDWEST	-0.8252 *	-1.4586	7.3901 **	-0.7189 **	-0.5154 *	0.6110	0.3098	0.4651 **	-0.8310
NOREAST	-1.5701 ***	-1.5238	7.8235 **	-1.6503 ***	-0.9507 ***	-2.4651	-0.3085	0.6251 ***	-6.8663 ***
SOUTH	-2.4300 ***	-2.1641	6.6104 *	-1.3603 ***	-1.4563 ***	2.0103	-0.2845	-0.1873	1.5008
TENURE	-0.6732	-0.4018 **	--	-0.7670 **	-0.7778 ***	--	-0.6348 ***	-0.5550 ***	--
UNRATE	9.8727	6.5066	-0.6887 *	-4.2991	-2.5477	-0.5483	9.8306 ***	10.4949 *	-1.8879 ***
DISABLED	0.9122 **	0.9458 ***	-7.2536 **	0.7822 **	0.7854 ***	-10.9377 ***	0.4350 *	0.4342 **	-7.6815 ***
ED	-359.2857	370.3940	--	1037.9215 *	1408.5155 *	--	673.3904 *	-247.9954	--
AGE	-116.1078	89.1821	--	-1.5299	-21.6491	--	-1.5551	-87.4804	--
NETWAGE	--	--	4.1077 ***	--	--	3.8075 ***	--	--	4.5180 ***
GAP	--	--	-0.0321 **	--	--	-0.0143 *	--	--	-0.0015
GFDPP	--	--	-0.0107	--	--	0.0116	--	--	0.0139
A A	--	--	10.7430 ***	--	--	7.9836 ***	--	--	3.0040 **
F F	--	--	-0.9092	--	--	-2.5662	--	--	-4.6800 ***
Observations	337			519			644		
RHO(A,F)	0.5987 ***			0.8151 ***			0.7868 ***		
Log. Likelihood	-247.95			-274.44			-477.44		
Adj. R^2			0.3958			0.4077			0.5178

Footnotes:

1 Some variables were scaled to facilitate model convergence in the bivariate probit model of AFDC and FSP participations. Therefore the reported coefficents are multiplied by the inverse of their scaling factor as follows: CPRIMEA, GPRIMEF, UNEARNED are multiplied by 1000; NEGWTSA, NECWTSF, NADULTS, UNRATE, KIDS05, KIDS610, and KIDS1117 are multiplied by 10 and, ED and AGE are multiplied by 100.

2 Asterisks denote significance at the 10 percent level (*), 5 percent level (**), and 1 percent level (***).

Before proceeding, certain naming conventions must be addressed. Define the following names as representing the variables indicated:

GPRIMEA	=	G'_A
GPRIMEF	=	G'_F
NEGWTSA	=	$-wt_A$
NEGWTSF	=	$-wt_F$
NETWAGE	=	$w(1 - t_A P_A - t_F P_F)$
GAP	=	$G'_A P_A$
GFDPP	=	$(G'_F - r_F G'_A P_A)P_F$

Additional variables included in X_A, X_F and X_H from (20), (21) and (25), respectively, are as named and defined in Table 1. These variable names plus those listed above are used in all tables, here and in the appendices.

Participation Results

When considering all three sets of participation equations in Table 2, two aspects are important to note. First, all three correlations between the error terms of each set, RHO(A,F), are positive and significant. For all single mother households, unobserved factors that increase the probability of participating in one program also increase the probability of participating in the other program. Second, keep in mind that the coefficients of all six participation equations are not easily interpreted. They are coefficients of the index function for participation. As such, they do not directly reveal how much the *probability* of participation will change if the variable in question changes. Nonetheless, significance, signs and magnitudes of index function coefficients in the table are suggestive of the direction and magnitudes of changes in participation probabilities and are appropriately discussed here.

Now turn to program attribute variables in the participation equations in Table 2, beginning with GPRIMEF (G'_F) and GPRIMEA (G'_A). Guaranteed household food stamp benefits at zero hours of work (GPRIMEF) have positive, though insignificant, effects on FSP participation regardless of where they reside. In contrast, guaranteed program benefits for AFDC (GPRIMEA) are positive and significant for suburban and urban households, but negative and insignificant for rural households. That is, the size of FSP benefits for all and AFDC benefits for rural single mother households have little or no effect on their respective probabilities of participation in those programs. Increasing the size of AFDC benefits, however, does significantly increase the probability that suburban and urban households participate in that program.

Coefficients for the difference in net wage rates on and off the programs, NEGWTSA ($-wt_A$) and NEGWTSF ($-wt_F$) are all positive, significantly so except for rural households' NEGWTSF. These coefficients mean that an increase in the wage differences would reduce the probability of program participation. Such wage difference increases could arise from higher wages or higher program taxes on earnings, holding everything else, including program benefits, constant. Thus, wage rates single mothers can garner in the labor force together with program earnings taxes play an important roles in program participation decisions.

Now turn to highlights of the effects of the non-program variables on AFDC and FSP participation. These variables can be organized into five groups: (1) household economic resources; (2) labor market conditions; (3) characteristics of the single mothers including marital status, race, education, age and disability status; (4) household structure and (5) region of residence. Highlights for these groups are discussed in turn.

Household economic resources (UNEARN and TENURE) are uniformly negatively related to single mother households' participation in AFDC and the FSP regardless of where they live. The coefficients for unearned income (UNEARN) are negative and large in all cases, but significantly different from zero only for the three AFDC participation equations. In contrast, the coefficients for homeownership (TENURE) are negative, small and statistically significant for both programs, with the exception of that for rural AFDC participation.

Labor market conditions as represented by the unemployment rates (UNRATE) have mixed effects on program participation depending on whether the household is rural, suburban or urban. For rural and urban households, as unemployment rates increase, participation in both programs increases as expected. The effect is significant only for urban households, however. The state UNRATE coefficients for suburban households' AFDC and FSP participation are unexpectedly negative, though insignificantly different from zero.[9]

With respect to the group of single mothers' characteristics, there are a number of notable effects on participation. The mother never having been married (NEVERMAR) is the only marital status that significantly affects participation in either program. Both suburban and urban never-married single mothers are significantly more likely to participate in the FSP than their respective widowed counterparts. Those in urban areas are also more likely to participate in AFDC. With respect to race, only urban black single mothers (BLACK) have significantly higher AFDC and FSP participation than their white counterparts.[10] Mothers' education levels (ED) have surprisingly large, positive and significant effects on suburban participation in both programs and on urban participation in AFDC. Perhaps higher education levels allow these mothers to negotiate the welfare system better than those with less education. Another characteristic of the mothers, their age (AGE), has no significant effect on participation regardless of where they live. In contrast, the final characteristic of mothers, their disability status

[9] There are two possible reasons for these surprising results. First, these are state unemployment rates. It was not possible to link the most appropriate county-level female unemployment rates to the SIPP data. Hence, I'm not sure exactly what we're capturing here. Second, if suburban women are working to replace former husbands' child support payments lost through his unemployment and if employment results in being ineligible for AFDC or food stamps, these results are reasonable.

[10] Note that there were too few rural observations of ORACE to allow estimation of the model, so the variable was dropped from the estimated equations.

(DISABLED), significantly and positively effects AFDC and FSP participation of rural, suburban and urban households.

The estimated relationships between program participation and household structure variables (KIDS05, KIDS610, KIDS1117 and NADULTS) are interesting. All four of these variables have no significant effects on rural and suburban households' FSP participation. For urban households, only the numbers of children in the two youngest children categories have significant positive effects on FSP participation. For AFDC, focus first on the number of children categories. All numbers of children by age category coefficients are positive, but significance varies depending on where they reside. For rural households the numbers of children in the youngest and oldest categories, for suburban households only the number of children in the youngest category and for urban households the numbers in the two youngest age categories have significant positive effects on AFDC participation. With respect to the number of adults in the household (NADULTS), the significant positive effect on AFDC participation is surprising, but it may be an artifact of how the children's age categories were constructed. In particular, 18-year-old children of the single mother were counted as adults. In this case, increases in NADULTS could logically increase AFDC participation.

The final group of non-program participation variables includes the regional categorical variables (MIDWEST, NOREAST and SOUTH). The coefficients for all three variables are negative in both participation equations for rural and suburban households. That is, suburban and rural households living in any of these regions are less likely to participate in AFDC or the FSP than are those who live in the West. The coefficients for the rural FSP participation equation are not significantly different from zero, however. Notably, the coefficient for the rural South is larger in magnitude that those of the rural Midwest or Northeast. Compared to rural western residents, rural southern residents are least likely to be AFDC participants holding everything else constant. In contrast, region of residence has no significant effect on urban AFDC participation. Further, urban residents of the Midwest and Northeast are significantly more likely to participate in the FSP than are urban western residents.

Two other methods for understanding the participation results are available in addition to considering the coefficients. First, conditional partial derivatives of the bivariate probability of participating in AFDC and the FSP with respect to each variable for each possible joint participation status can be calculated. The derivatives yield an answer to the following question: By how much will participation in both programs, AFDC only, FSP only and neither program change with a one unit change in each respective independent variable? While not discussed here, those partial derivatives or marginal effects are presented in appendix tables F1-F12 for the interested reader. A second approach is to simulate the percent changes in participation associated with each respective independent variable. We utilize this approach as a means to understand how AFDC and food stamp program attributes affect participation in our discussion of the policy parameters in Section V.

Hours Results

The estimated hours equations for rural, suburban and urban single mothers are also presented in Table 2. Two general observations merit discussion. First, the adjusted R^2 statistics for the hours equations range from 0.3985 for rural mothers to 0.5178 for urban mothers. These statistics are quite high for cross-section analyses such as those undertaken herein. The latter indicates that the urban hours equation explains more than half of the variation in urban single mothers' labor supply (hours of work). Second, some of the coefficients on the lambda terms, λ_{AA} and λ_{FF}, have unexpected signs.

We would expect the signs for both lambda terms to be negative as was found by Fraker and Moffitt using a different econometric model. That is, we expect unobserved factors that increase AFDC and FSP participation to be negatively related to unobserved factors affecting hours of work. While we do find negative coefficients for λ_{FF} for the food stamp program, only the urban coefficient is significantly different from zero. The coefficients on λ_{FF} for the AFDC program, however, are all positive and significant, suggesting positive correlations between AFDC participation and hours equations' error terms. This finding is counterintuitive and may be the result of incompletely specifying the relationships between the programs in the participation equations.

There are three variables in the hours equation that are functions of AFDC and food stamp program parameters and participation, NETWAGE, GAP and GFDPP. The latter two relate to the guaranteed benefits at zero hours of work $G'_A P_A$ and $(G'_F - r_F G'_A P_A) P_F$, respectively. In general, we would expect hours of work to decline as guaranteed benefits increase. For GAP, we find the expected negative signs for all single mother households with rural and suburban responses significantly different from zero. For GFDPP we find only one negative sign for rural single mothers, but none of the responses are significantly different from zero. This could be due to the construction of the variable. GFDPP takes on the value of G'_F if the household participates only in the FSP or $G'_F - r_F G'_A$ if they participate in both programs. The latter can never be less than zero. If the household participates in AFDC only or in neither program, GFDPP equals zero. Thus, this variable ranges from zero to G'_F and may be zero for many households, given all the possible participation choices. Further explorations with alternative specifications that decouple the food stamp guarantee may yield better estimates of the effect of G'_F on hours of work.

As expected, NETWAGE, $w(1 - t_A P_A - t_F P_F)$, has positive and significant effects on single mothers' labor supply regardless of where they reside. NETWAGE is a function of both the AFDC and FSP taxes on earnings. The significant positive coefficients for these variables mean that as net wages increase, either due to a wage increase or a reduction in program earnings taxes, hours of work increase. Even with this straightforward result, further discussion of the NETWAGE variable is needed.

As explained in Appendices B and C, $t_F = 0.246$ and the AFDC earnings tax, t_A, equals 1 or 0.67 depending upon whether the mother worked more than four months or four months or less, respectively. Thus, depending upon the household's program participation status and the mother's work history, the term in parentheses of the

NETWAGE variable, $1 - t_A P_A - t_F P_F$, takes on one of six possible values. If the household participates in neither program, the term equals one and NETWAGE equals the market wage, *w*. If the household participates only in the FSP, the term equals 0.754 and NETWAGE equals 0.754*w*. Participation only in AFDC yields net wages of zero or 0.33*w*, depending on the mother's work history. Similarly, participation in both programs yields net wages of –0.246*w* or 0.084*w*. In Section II's descriptive analysis, we learned that even with labor supply of more than full time, some households participate only in AFDC and others in both programs. The single mothers of those households face net wages of –0.246*w*, 0, 0.084*w* or 0.33*w*. The latter two may yield virtually zero returns to work, given childcare costs. For the first one, childcare costs would make the return even more negative or change a zero return to a negative return, respectively.

Given a negative return to work, a rational single mother would not *voluntarily* choose to work. Only *coercion* could get her to do so. There must be something else going on. The likely "something" is the fact that AFDC households are categorically eligible for health insurance through Medicaid. That insurance, though not valued or included in the official definition of poverty or in the calculation of unearned income for the purpose of determining benefits, has unknown positive value to single mothers and their households. Thus, the apparently irrational choice to work, when participating in AFDC or in both programs, may actually be a rational choice.

Turning to the non-program variables in the hours equations, signs and significance of many of those variables are generally as expected. Unearned income (UNEARN), the state unemployment rate (UNRATE) and mothers' disability status (DISABLED) all negatively effect labor supply, significantly so for all but suburban mothers' UNRATE response. One interesting result is that single mothers' race has no effect on hours of work regardless of where they live.

Single mothers' marital status and their households' family structure and region of residence have interesting signs and patterns of significance across the rural to urban continuum. The coefficients on all the marital status variables (DIV, SEP and NEVERMAR) are positive, indicating that these single mothers work more hours per week than their widowed counterparts. More importantly, for rural single mothers, only being divorced significantly increases labor supply. For suburban single mothers, being divorced or separated has significant effects and all three marital statuses are significant for urban single mothers. In all cases, divorced single mothers have the strongest labor force attachment.

With respect to children, only the number of children in the oldest age category for rural households is significant. Interestingly, the other family structure coefficients for the number of adults in the household (NADULTS) are positive for all households, significantly so for rural and urban households. This suggests that other adults in the household could take care of younger children while the mother works or they are 18-year old children who do not need day care.

Midwestern, northeastern and southern rural single mothers work significantly more hours per week compared to western rural households. In contrast, suburban households exhibit no significant differences in labor supply based on region of residence. For urban single mothers, only residing in the northeast is significant. They work significantly fewer hours per week than their western urban counterparts.

G. Summary

In this section we developed and reported the estimation results for our econometric model of rural, suburban and urban single mothers' AFDC and FSP program participation and labor supply decisions. The model follows directly from the theoretical framework in Section III and extends previous research. The model also addresses a number of econometric issues. Because wages are not observed for mothers who do not work, a Heckman two-step procedure was utilized to predict wages for each subsample based on working mothers' wages. To account for possible correlation between the error terms of the program participation equations, a bivariate probit model of joint AFDC and FSP participation was estimated. Finally, to correct for the endogeneity of participation in the hours equations and to allow estimation of a continuous labor supply or hours function, rather than categories of labor supply, we implemented an endogeneity or sample selection correction procedure based on the bivariate probit estimates.

The estimation results indicate that the bivariate probit approach to estimating the program participation equations was appropriate, given the positive and statistically significant estimates of the error term correlations RHO(A,F). In contrast, the method of correcting for endogenous participation variables in the hours functions showed somewhat mixed results as indicated by some unexpected signs on the endogeneity correction factors, λ_{AA} in particular. Even so, this approach allowed estimation of continuous hours functions and the participation and hours estimates yield reasonable and interesting results.

Because we seek to guide states as they evaluate and/or redesign their own TANF cash welfare programs operating in tandem with the Federal FSP, we utilize our estimated model to address how particular AFDC and FSP policy parameters affect program participation and labor supply in the next section.

V. EFFECTS OF POLICY PARAMETERS

A. Introduction

This section focuses on AFDC and FSP program parameters that characterize each program's structure. The parameters of interest are policy instruments: taxes on earnings (t_A and t_F); taxes on unearned income (r_A and r_F); and guaranteed benefits at zero hours of work (G'_A and G'_F). Policymakers can use these policy parameters as tools or instruments of change. They can set or change the parameters to alter actual or potential recipients' responses to programs, to better meet recipients' needs and/or to change program costs. How single mothers respond to changes in these parameters is, therefore, important information. While other studies provide some guidance, here we offer specific information regarding how rural, suburban and urban single mothers change cash and in-kind program participation and labor supply in response to AFDC and FSP policy parameter changes.

B. Participation

To illustrate how AFDC and FSP program participation might adjust to policy parameter changes we utilize the bivariate probit estimates from Table 2 in Section IV. We first select a representative single mother's household. Then we ask the following question: How would her household respond to changes in program parameters if it were rural, suburban or urban? Answering that question takes a number of steps.

How her household's program participation would respond to a range of values for one program parameter as if she were a resident of one of the three areas is predicted. Her household is then artificially "transformed" into residents of the other areas, in turn, each time varying the same program parameter. We then follow the same procedure for each of the other program parameters. This process allows distillation of basic differences between rural, suburban and urban program participation choices from the bivariate probit model.

For example, for the AFDC tax on earnings, t_A, we predict four participation probabilities for a number of possible values of the tax ranging from close to zero to one as if the representative household is rural. The four probabilities include all possible participation combinations, the probability of choosing to participate in AFDC and the FSP, AFDC only, FSP only and in neither program. To do so, we utilize the bivariate normal distribution evaluated as a function of the appropriate estimated coefficients and error term correlations from the rural AFDC and FSP participation equations in Table 2 and associated representative household characteristics as listed in Table 3. To "transform" the household into a suburban and then an urban one, we follow the same procedure applying the suburban and urban participation coefficient and correlation estimates, in turn.

Figures 6, 7 and 8 portray participation choice probabilities associated with changes in the AFDC earnings tax when our representative household is rural, suburban and urban, respectively. As a general comparison, all three figures show what we would expect: The probabilities for the two choices that include AFDC (participation in both programs or AFDC only) decline and the probabilities of choosing neither program or only FSP increase as the AFDC earnings tax increases. When the AFDC tax is less than 0.3 our suburban household clearly prefers participation only in AFDC to all other choices. Above that point the probability of no program participation dominates, climbing to 0.65 when t_A reaches one.

While differing from the suburban pattern, the urban and rural patterns are quite similar. When urban, the household's probability of choosing participation in both programs dominates virtually the entire AFDC earnings tax range. Those urban probabilities range from 0.73 to 0.35 as the tax ranges from zero to one. When the household is rural, the same choice, participation in both programs, dominates for most of the tax value range. When $t_A = 0$, that choice probability is 0.6 and reaches 0.34 when the

Table 3: Characteristics of the Representative Single Mother and Her Household

Variable	Value
r_A	1
t_A	0.67
r_F	0.3
t_F	0.246
GPRIMEA	127
GPRIMEF	199
w	5.54
$-wt_A$	-3.7118
$-wt_F$	-1.36284
UNEARN	300
KIDS05	1
KIDS610	1
KIDS1117	0
NADULTS	1
DIV	0
SEP	0
NEVERMAR	1
BLACK	1
ORACE	0
MIDWEST	0
NOREAST	0
SOUTH	1
TENURE	0
UNRATE	8.4
DISABLED	0
ED	12
AGE	30

Figure 6: Program Participation as t_A Varies for Representative Rural Single Mother

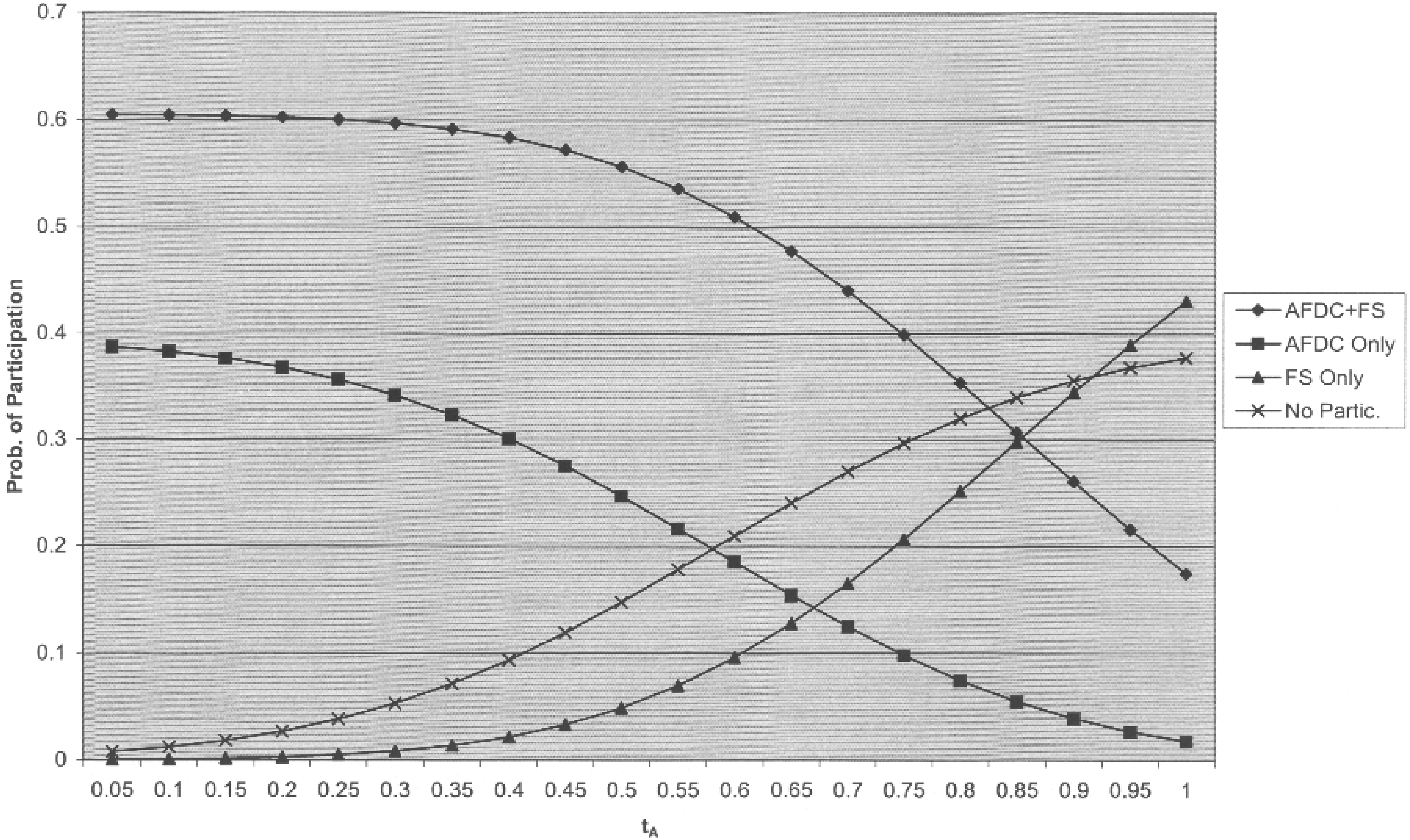


Figure 7: Program Participation as t_a Varies for Representative Suburban Single Mother

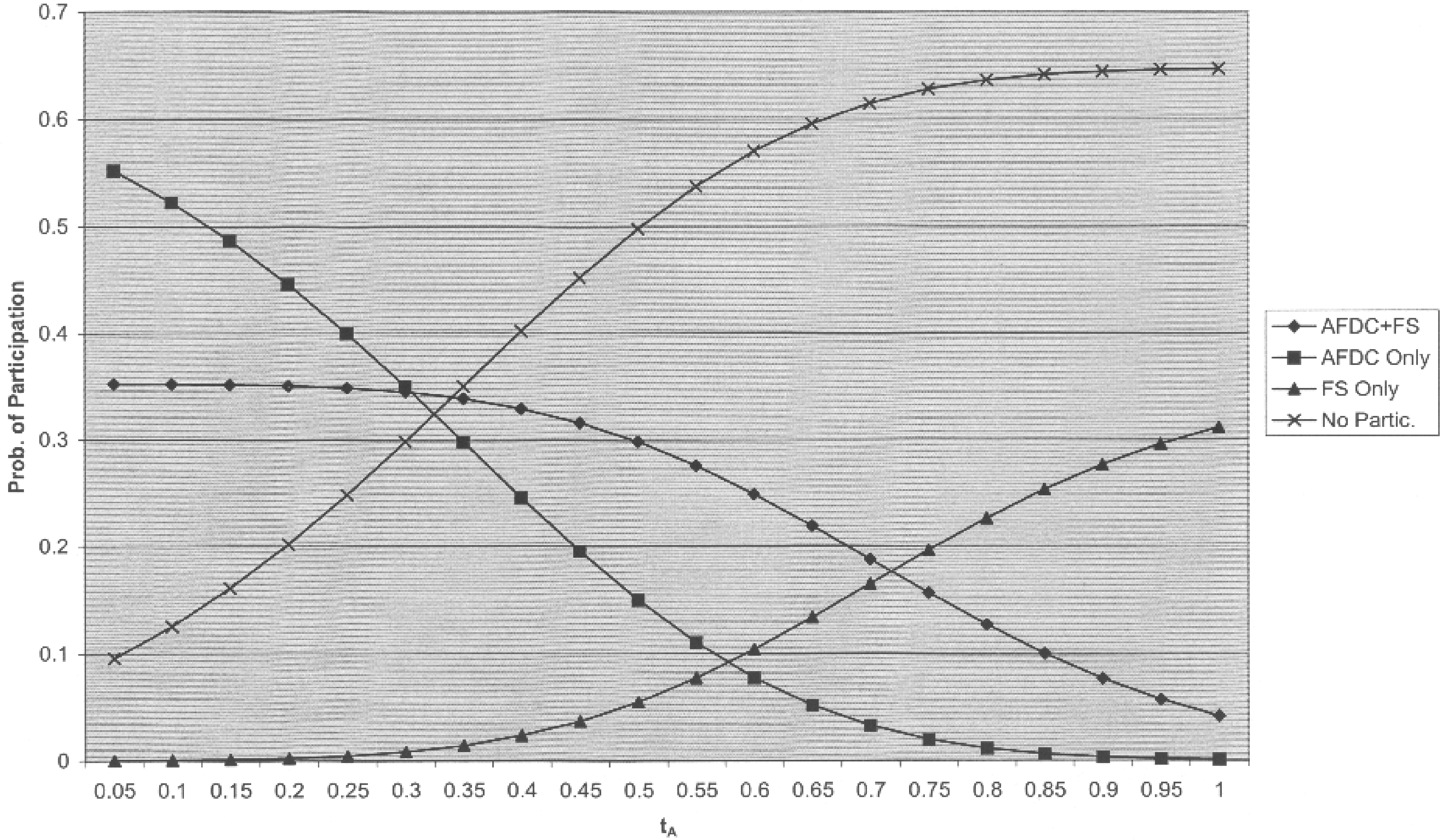
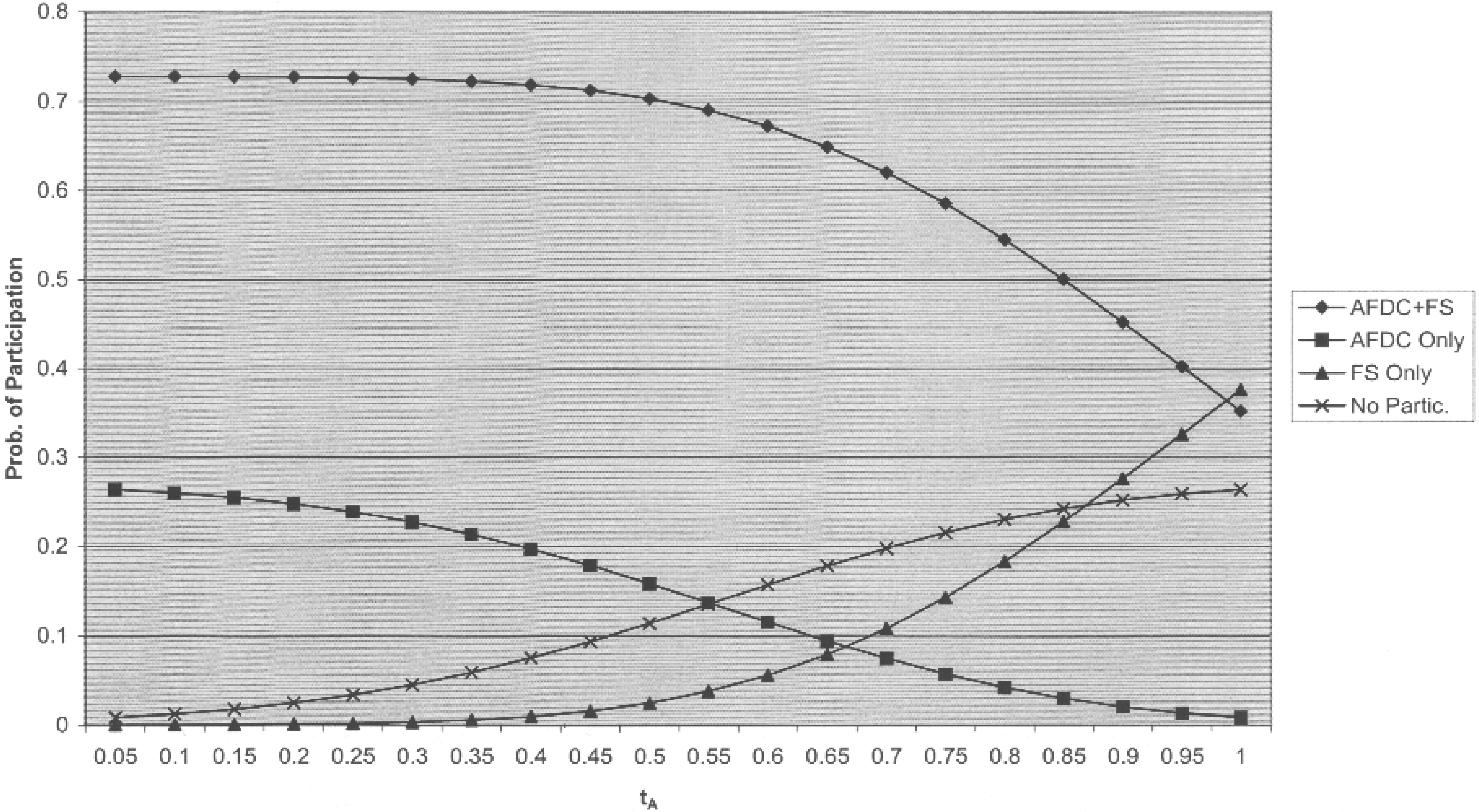


Figure 8: Program Participation as t_A Varies for Representative Urban Single Mother



tax is approximately 0.8. When $t_A = 1$, the dominant choice probability is 0.42 for participation only in the FSP.

We see quite different patterns with changes in the FSP earnings tax (t_F) in Figures 9, 10 and 11. Our representative household's rural and urban dominant choices switch from participation in both programs to participation only in AFDC as FSP's earnings tax increases. At $t_F = 0$, rural and urban probabilities of participating in both programs are 0.6 and 0.7, respectively. At the other extreme of t_F the rural and urban choices shift to 0.6 and 0.7 probabilities of participation only in AFDC, respectively. This switch is more dramatic when the household is rural and occurs at a lower level of t_F.

As was the case for AFDC's earnings tax, the suburban response to FSP's earnings tax differs markedly from the urban and rural responses. As t_F increases, the household switches abruptly from a strong likelihood of only FSP participation (0.75) to an equally strong likelihood of no program participation. The switch occurs at a low level of the FSP earnings tax, $t_F = 0.2$.

For considering guaranteed maximum program benefits, we present only choice probability graphs for the AFDC guarantee, GPRIMEA in Figures 12, 13 and 14. We omit the FSP's maximum benefit because GPRIMEF has no significant effect on FSP participation as shown in Table 2. In general, we would expect the AFDC only and AFDC plus FSP participation choice probabilities to increase as GPRIMEA increases. Both occur when our representative household is suburban or urban, but not when it is rural. Given that this variable is insignificant in the rural participation equation, a more appropriate depiction would be horizontal lines for the rural choice probabilities in Figure 12. This would indicate no rural response to changes in GPRIMEA.

The suburban responses to changes in AFDC's guaranteed benefit substantially differ from rural and urban responses. If the household is suburban, the no-program-participation choice probabilities dominate all other choices for the entire range of AFDC guaranteed benefits, with a slight decline as the benefit increases. In contrast, the AFDC plus FSPchoice probabilities dominate the rural and urban cases. When urban, however, those choice probabilities and the ones for participation only in AFDC are higher than when the household is rural.

Figures 15, 16 and 17 show rural, urban and suburban responses of our representative household to changes in AFDC's tax on unearned income, r_A, respectively. Recalling that the corresponding tax for FSP affects participation only through statistically insignificant GPRIMEF, we do not graph those results. As was the case for GPRIMEA, suburban and urban choice probabilities associated with AFDC decline slightly and rural probabilities increase as AFDC's unearned income tax increases. The latter should more appropriately be interpreted to be unchanged as these taxes change. Also similarly, for urban and rural cases the household's probability of participating in both programs dominates all other choices for the entire range of r_A. The dominant suburban choice is no participation and the probability of that choice increases slightly as r_A increases.

Figure 9: Program Participation as t_F Varies for Representative Rural Single Mother

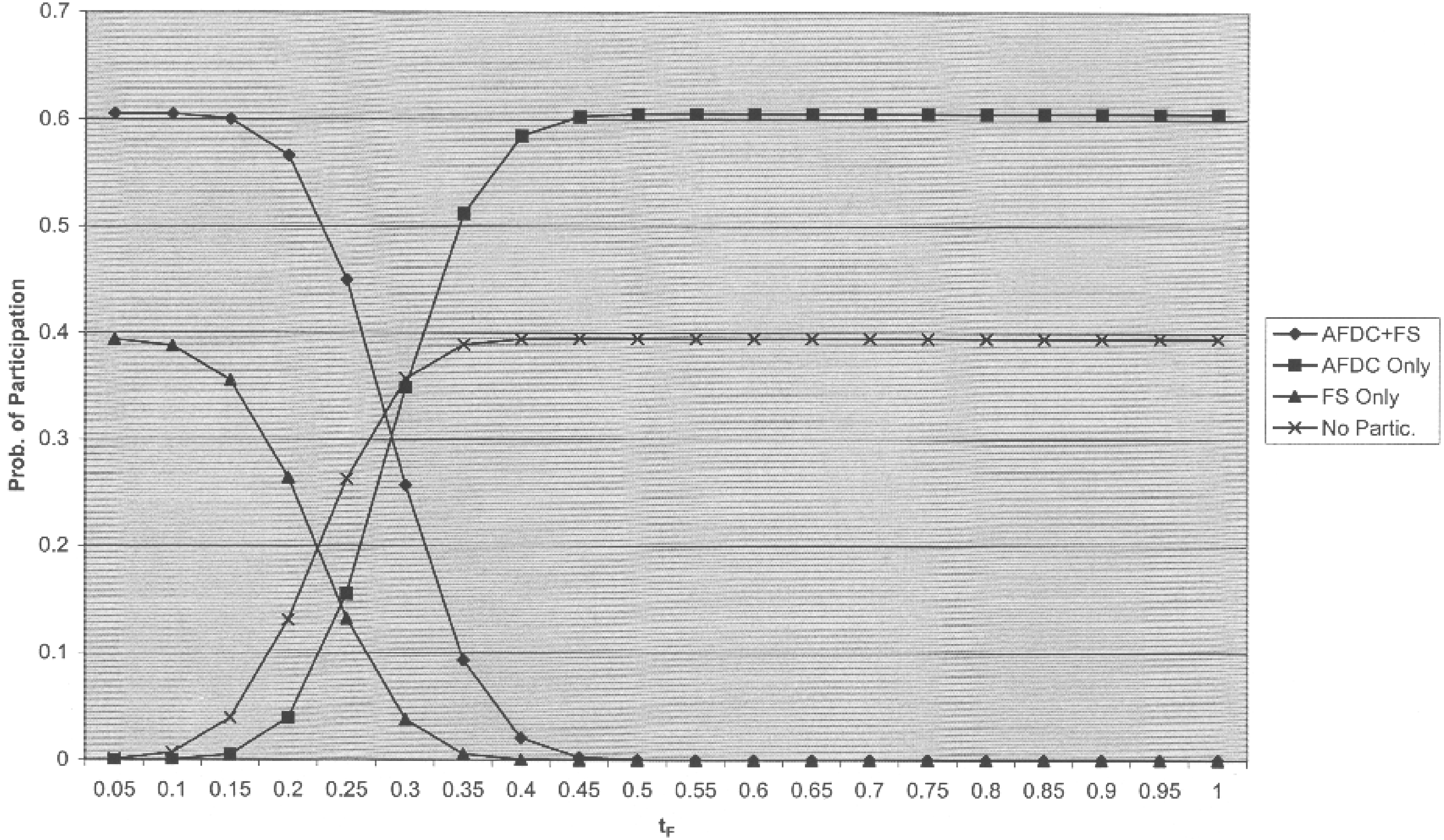


Figure 10: Program Participation as t_F varies for Representative Suburban Single Mother

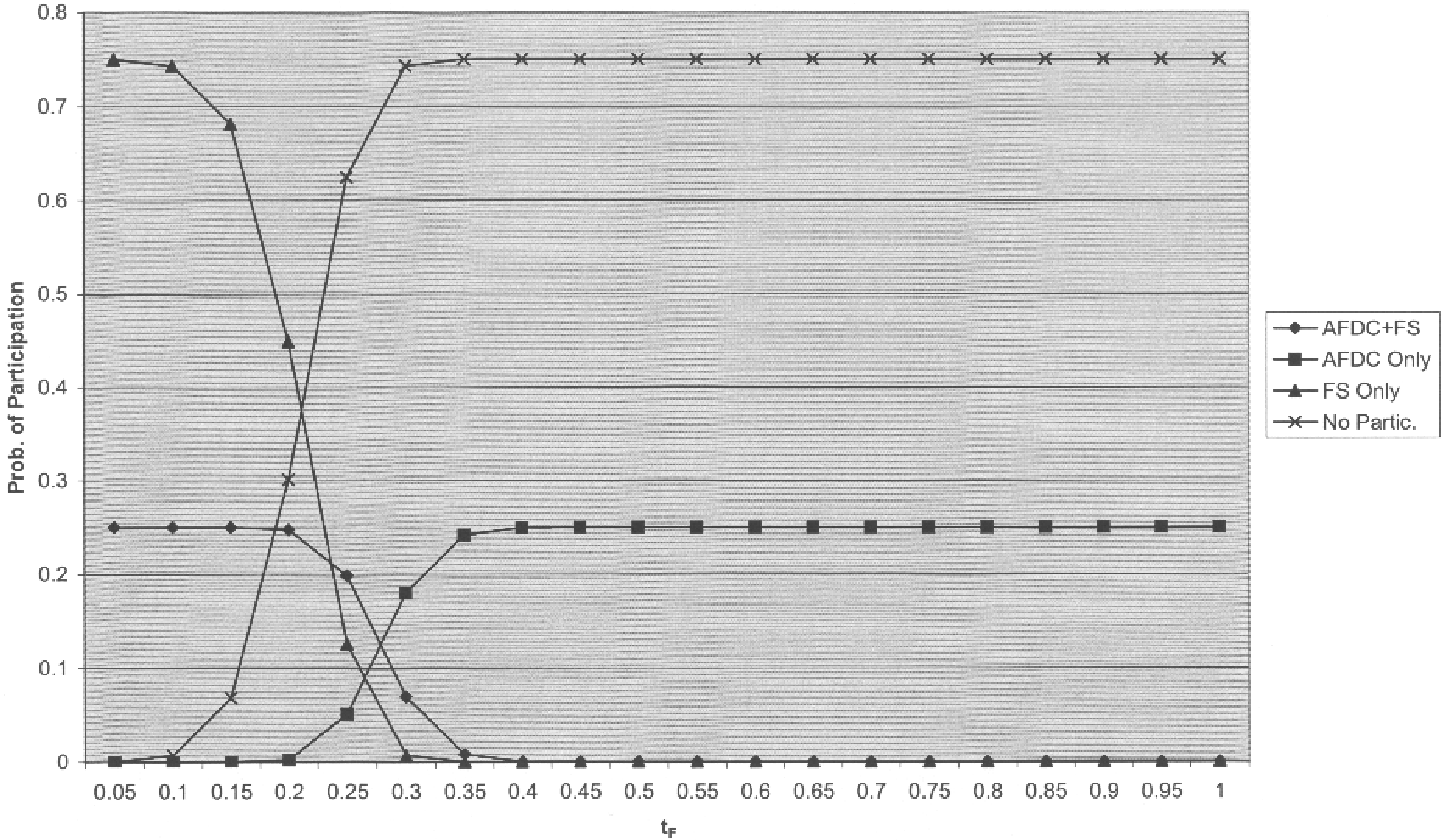


Figure 11: Program Participation as t_F Varies for Representative Urban Single Mother

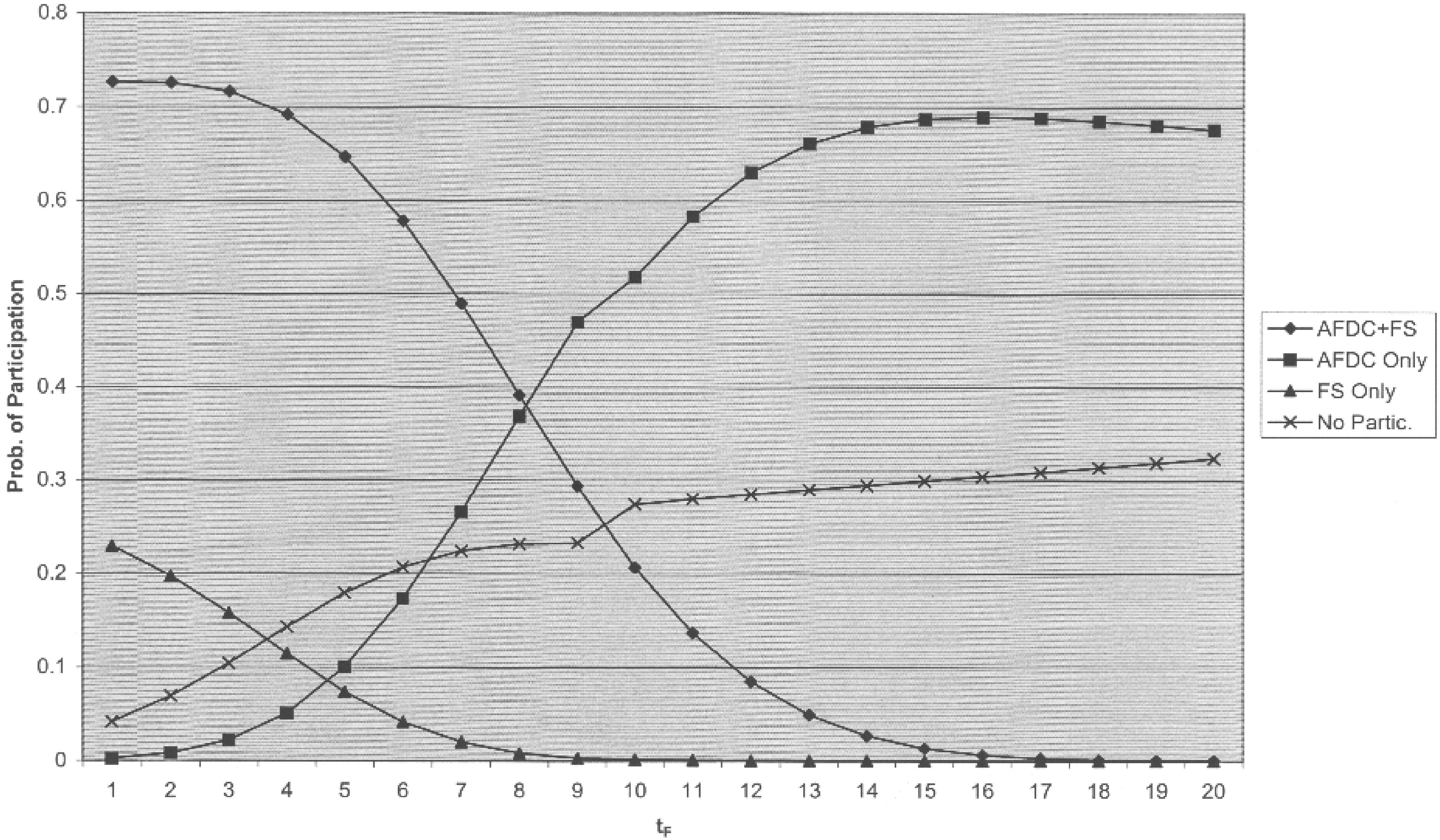


Figure 12: Program Participation as GPRIMEA Varies for Representative Rural Single Mother

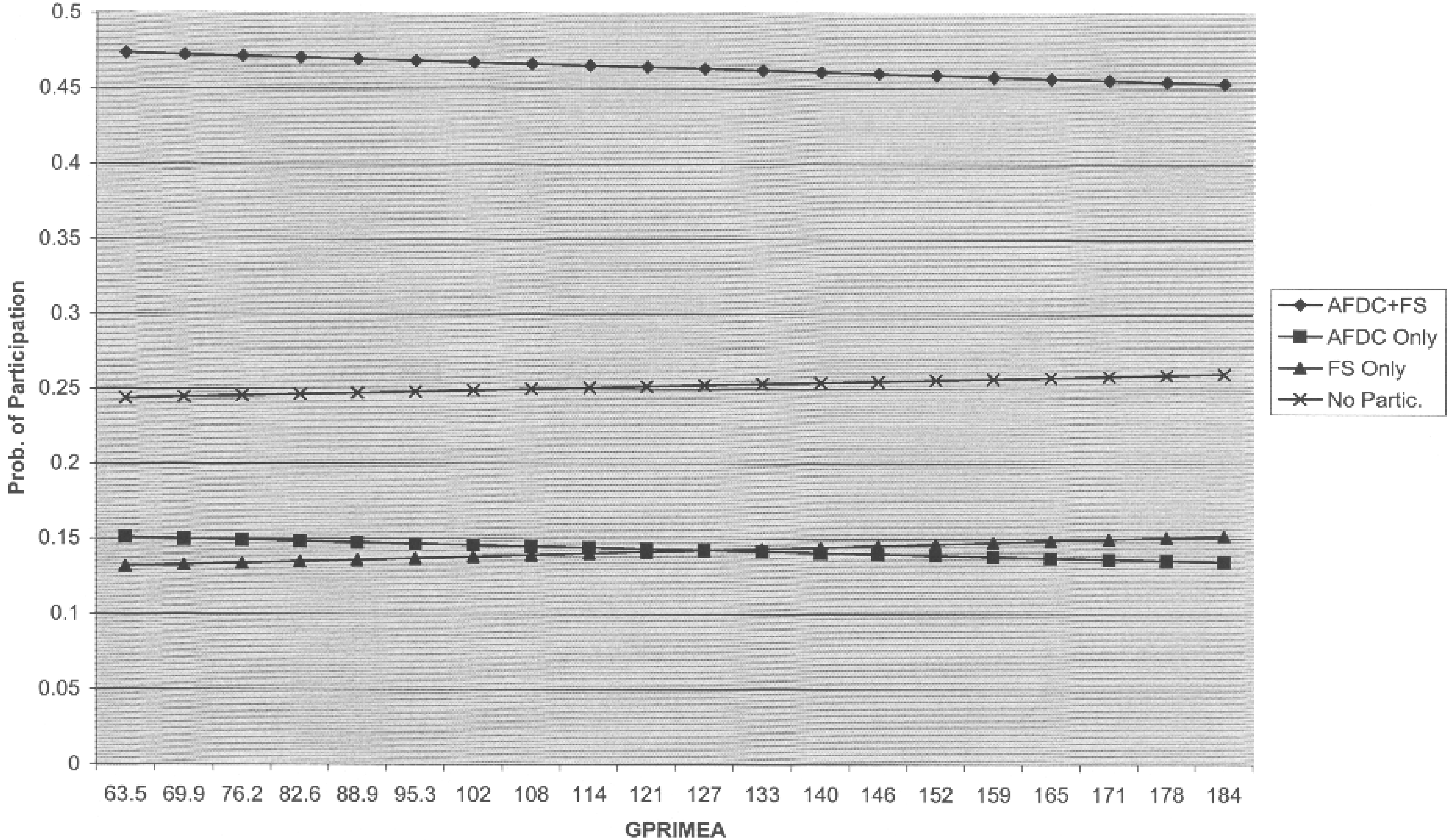


Figure 13: Program Participation as GPRIMEA Varies for Representative Suburban Single Mother

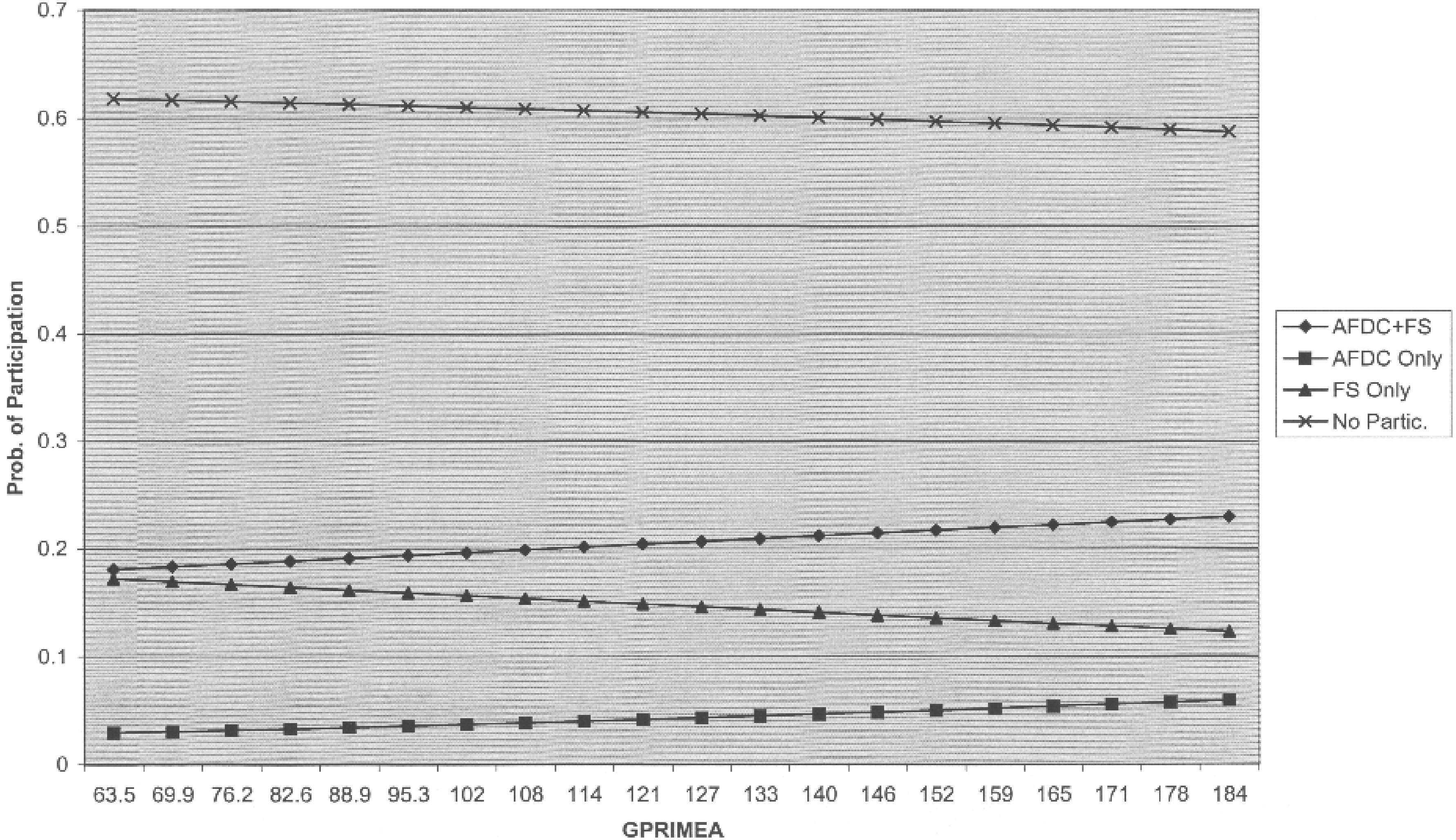


Figure 14: Program Participation as GPRIMEA Varies for Representative Urban Single Mother

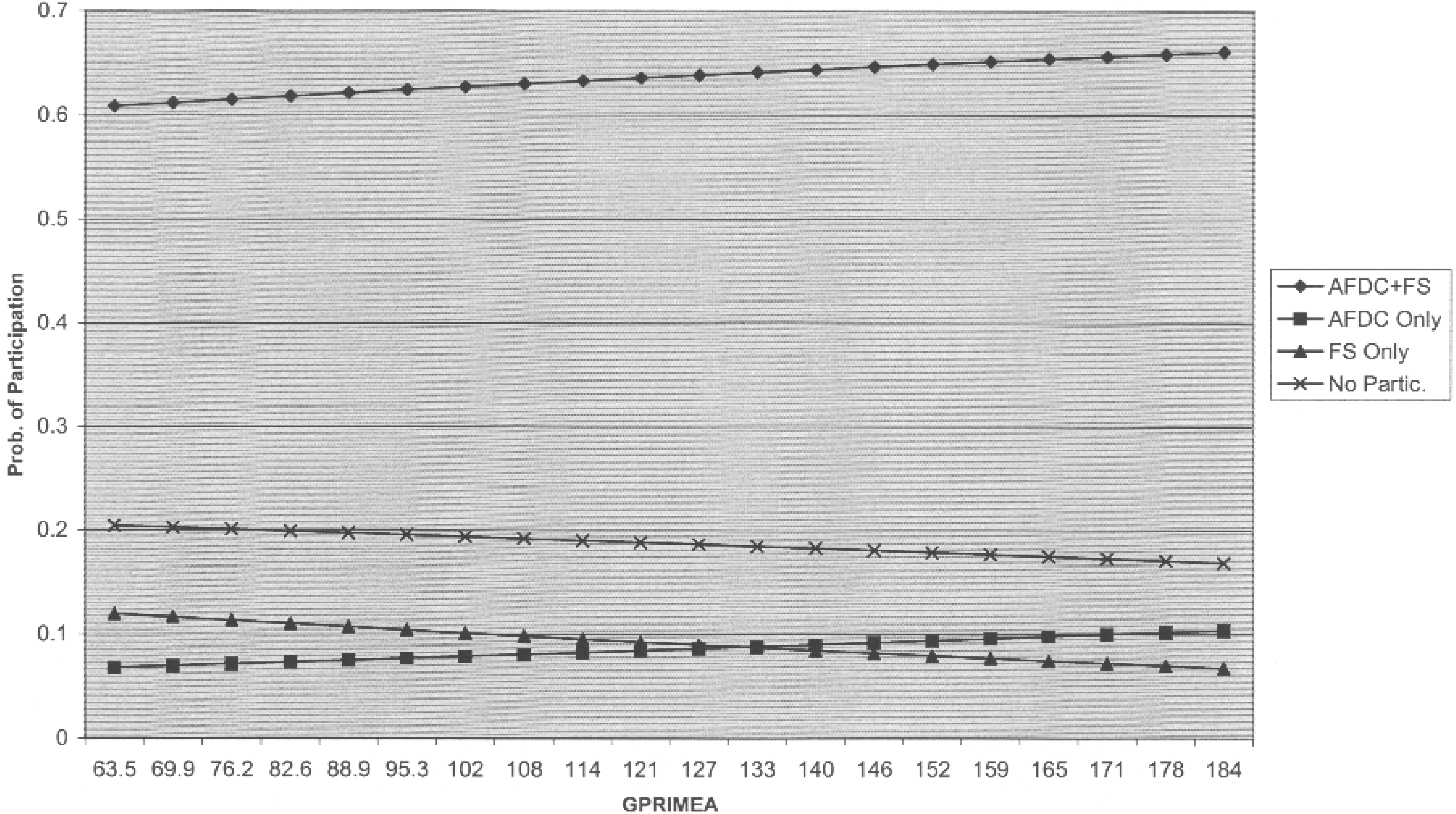


Figure 15: Program Participation as r_A Varies for Representative Rural Single Mother

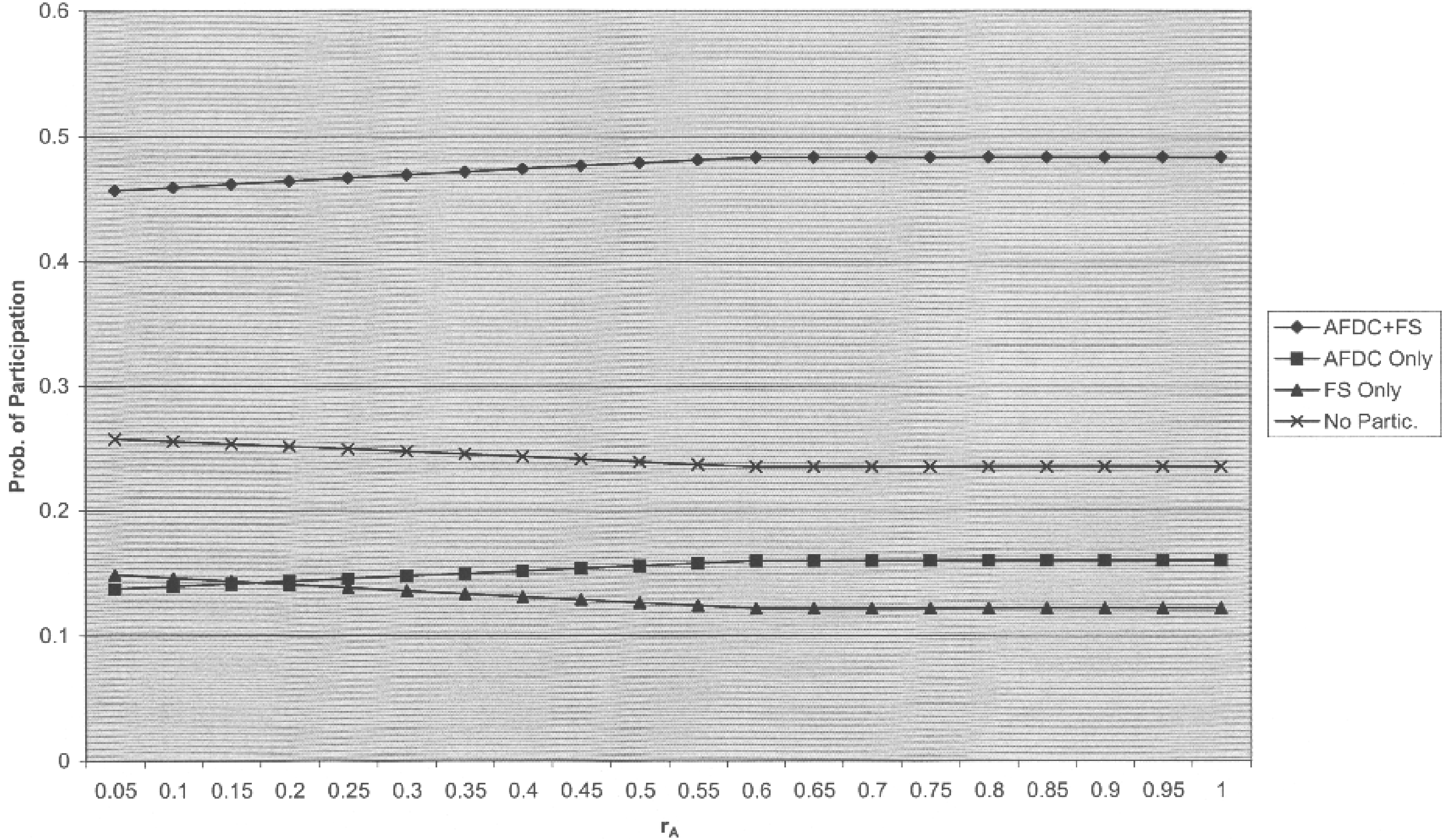


Figure 16: Program Participation as r_A Varies for Representative Suburban Single Mother

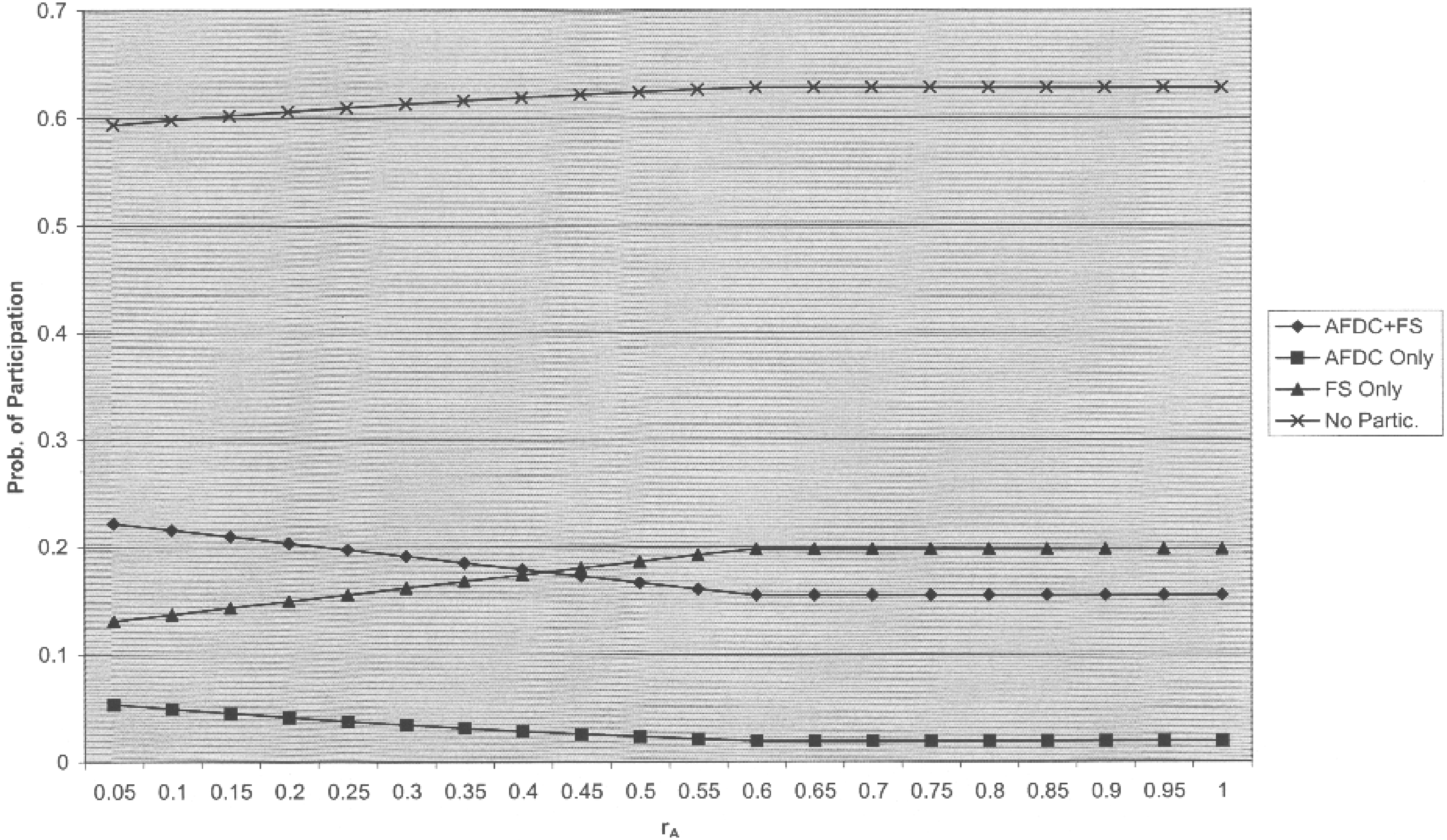
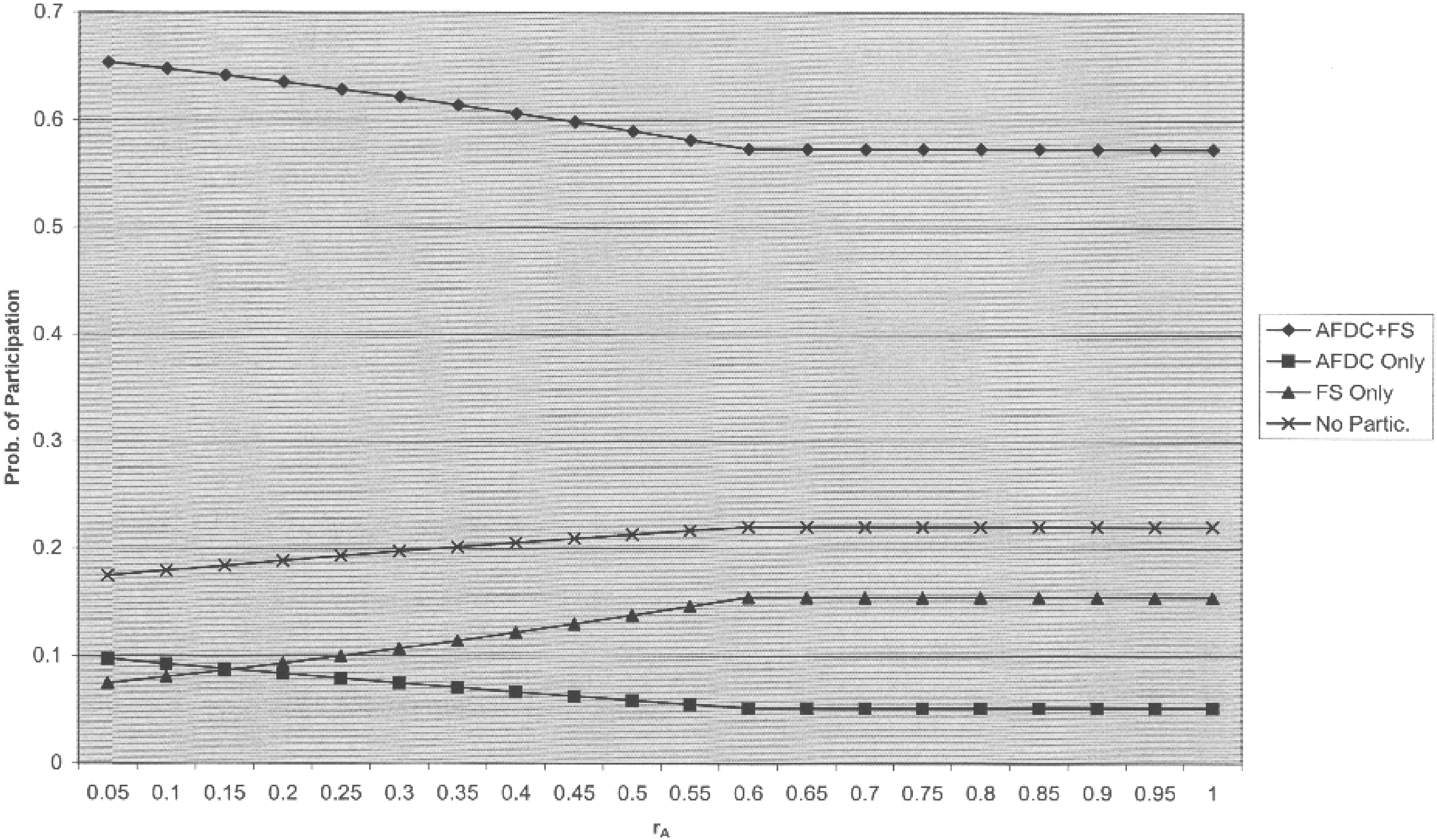


Figure 17: Program Participation as r_A Varies for Representative Urban Single Mother



Taken together, Figures 6 through 17 display patterns, which should be of interest to policymakers. Extrapolating from our representative household, all the policy parameters affect rural and urban households similarly. There are, however, some important differences. Rural households appear more responsive to changes in both AFDC and FSP earnings taxes than do urban households, particularly with respect to the FSP's tax. That is, small increases in the FSP earnings tax would dramatically decrease the probability that rural households participate in that program. In contrast, urban households are somewhat more responsive to the other AFDC-related policy parameters than are their rural counterparts. Urban households reduce AFDC-related participation choices when AFDC's unearned income tax increases. Their choice probabilities increase along with AFDC's guaranteed benefit. Rural households' program participation choices are virtually unaffected by either policy parameter change.

Suburban households' responses to policy parameter changes generally differ markedly from those of the rural and urban counterparts. Regardless of which parameter changes, suburban households predominantly choose no program participation. The effect is most dramatic for changes in the FSP earnings tax. While not the predominant choices, suburban households also have second-level responses to policy parameter changes. As AFDC's earning tax increases, suburban households' choice probabilities do shift away from AFDC-related participation toward FSP only participation. Similarly, as FSP's earnings tax increases, they shift away from FSP-related participation toward AFDC only participation. Finally, they increase their AFDC-related participation with increases in GPRIMEA and decrease such participation with reductions in AFDC's unearned income tax.

C. Hours of Work

Correct interpretation of how the six policy parameters, t_A, t_F, r_A, r_F, G'_A and G'_F affect single mothers' hours of work is more complex than might appear at first glance. The policy parameters appear in at least one of three hours equation variables, GAP = $G'_A P_A$, NETWAGE $= w(1 - t_A P_A - t_F P_F)$ and GFDPP = $(G'_F - r_F G'_A P_A) P_F$. The most appropriate method for evaluating how these parameters work their way through these variables and affect hours or labor supply is to calculate elasticities.

As a first step toward obtaining these elasticities is to calculate partial derivatives of the hours equation (25) with respect to the policy parameters as follows: [8]

(26a) $\partial H/\partial t_A = c_2 P_A$,

(26b) $\partial H/\partial t_F = c_2 P_F$,

(26c) $\partial H/\partial r_A = c_4(\partial G'_A / \partial r_A) P_A - c_5\, r_F(\partial G'_A / \partial r_A) P_A P_F$,

(26d) $\partial H/\partial r_F = c_5(\partial G'_F / \partial r_F - G'_A P_A) P_F$,

(26e) $\partial H/\partial G'_A = c_4 P_A - c_5 r_F P_A P_F$ and

(26f) $\partial H/\partial G'_F = c_5 P_F$.

[8] Here we ignore the complex effects through the lambda terms because they are present to generate unbiased estimates of the other coefficients in the hours equation.

The next step would be to multiply each of the partial derivatives by the appropriate policy parameter divided by hours of work, evaluated at the relevant subsample means to yield the elasticities of hours with respect to the relevant policy parameter. Note, however, those elasticities assume participation is held constant, which we know is not the case. Any policy parameter change simultaneously alters participation and hours of work. Program participation, therefore, must also be allowed to vary to fully understand how policy parameters effect hours of work.

We, therefore, calculate hours (arc) elasticities as follows. First, we predict the probability of participation in each program for each observation. Those predicted probabilities are substituted for actual participation in the hours equation to predict hours of work for each observation. Then we increase one of the policy parameters, t_A for example, by ten percent, and re-predict participation probabilities and hours of work, in turn. The difference between the original prediction and that obtained after the ten-percent change in t_A is the value of the elasticity. We repeat the process for each of the other five policy parameters. The resulting elasticities should be interpreted as the percent change in hours of work arising from a ten-percent change in the policy parameters, allowing program participation to vary.

The elasticities for rural, suburban and urban single mothers are presented in Table 4. We report the 25^{th}, 50^{th} (median) and 75^{th} percentile for each elasticity as well as means and standard deviations because the elasticity distributions are generally highly skewed.

The hours elasticities for t_A, listed in the first results column of Table 4 indicate that a ten percent increase in AFDC's earnings tax raises average hours of work by 0.51, 0.26 and 0.56 percent on average for rural, urban and suburban households, respectively. Given average weekly work hours of 23, 25 and 19 for those same cohorts, these mean elasticities imply weekly labor supply increases of 0.12, 0.07 and 0.11 hours per week by rural, suburban and urban single mothers, respectively.

These elasticities raise three important points. First, an interesting story can be told from the distributions of these elasticities. Even though the average effects of the AFDC earnings tax are positive, those means fall somewhere between the median and the 75^{th} percentile of the elasticity distributions for all single mothers. Furthermore, those elasticities are zero or virtually zero for at least the first quartile of households, regardless of where they live. From the vantage of the median, at least half of the single mothers have little or no change in labor supply associated with the AFDC earnings tax increase.

Second, the rural and urban elasticity means and distributions for t_A are relatively similar, yet quite different than those for suburban households. One might try to explain this pattern by looking for corresponding differences and similarities in AFDC participation. That is, perhaps suburban households are less responsive to changes in the AFDC earnings tax rate because they are less likely to participate in the program. Rural households' participation (26 percent) is closer to that of their suburban (22 percent) than their urban (37 percent) counterparts. Thus, the participation patterns cannot explain why

Table 4: Distribution of the Elasticity of Total Hours with respect to Changes in AFDC and Food Stamp Program Policy Parameters

		Policy Parameters					
Sub-Sample	Statistic	t_a	t_f	r_a	r_f	gprimea	gprimef
Rural							
	25th Percentile	0.0000	-0.7795	0.0000	-0.0215	-0.0046	-2.6660
	Median	0.1129	-0.3347	0.0000	0.0000	0.0000	-0.9055
	75th Percentile	0.5715	-0.1347	0.0000	0.0140	0.0021	0.0000
	Mean	0.5062	-1.2756	0.4770	0.1046*	-0.3897	-1.5178
	Std. Deviation	2.4697	2.4746	0.5187	0.6682	1.5132	6.1431
Suburban							
	25th Percentile	0.0008	-5.1991	0.0000	-0.0069	-0.4184	-0.5382
	Median	0.0432	-2.2655	0.0000	0.0000	-0.0721	-0.1703
	75th Percentile	0.3214	-0.4945	0.0000	0.0052	-0.0090	-0.0182
	Mean	0.2607	-2.5063	0.0049	0.2477	-0.5464	-0.6454
	Std. Deviation	0.8206	5.8660	0.0430	5.2055	1.4139	1.4716
Urban							
	25th Percentile	0.0000	-0.1370	0.0000	-0.0478	-0.6890	0.0000
	Median	0.1870	0.0000	0.0000	-0.0055	-0.1629	0.0229
	75th Percentile	0.5910	0.0181	0.0000	0.0000	0.0000	0.1554
	Mean	0.5623	-0.1990	0.0299	-0.1296	-0.6306	0.7123
	Std. Deviation	6.2828	0.6784	0.5088	0.7372	1.4056	7.2351

* One observation was dropped for calculating the mean and standard deviation of rf because it was an extreme outlier.

rural and urban households have such similar responses to AFDC's earnings tax. High urban program participation, however, might explain why urban households are most responsive to the AFDC earnings tax.

Third, the direction of these elasticities seems counterintuitive. A priori, one might expect work hours to decline because higher taxes on earnings reduce returns to work. With welfare programs and negative income tax schemes more generally, participation must also be considered. Higher earnings taxes (lower benefits) can make program participation less attractive. So, some households may choose nonparticipation. Others may become ineligible for program benefits. Their nonparticipation, in turn, increases their work effort. The fact that all three participation coefficients for NEGWTSA ($-wt_A$) in Table 2 are positive and significant reinforces this argument. The decrease in the probability of AFDC participation associated with the earnings tax increase must outweigh the direct reduction in work effort one might expect through NETWAGE in the hours equation to yield the positive hours elasticities we observe for this policy parameter.

For the FSP's earnings tax (t_F), the means and distributions of elasticities are quite different. All the means are negative, rather than positive, despite the fact that the FSP participation coefficients for NEGWTSF ($-wt_F$) are all positive, as are those for AFDC. Here, average hours responses appear relatively less affected by program participation reductions and the expected direct reduction in work from the tax increase dominates. With mean elasticities of –0.13, -2.51 and –0.20, rural, suburban and urban single mothers would reduce their labor supply by 0.03, 0.63 and 0.04 hours per week respectively, on average, if the FSP earnings tax increases by ten percent.

The distributions of elasticities for the FSP earnings tax also differ dramatically from those for AFDC. Overall, suburban households are most responsive to the FSP earnings tax along the entire distribution, even though substantially fewer of them (27 percent) participate in the program compared to rural (43 percent) and urban (46 percent) households. In contrast, urban households are least responsive and also have a unique pattern wherein their responses shift from negative to positive. For the latter, the reduction in participation associated with the FSP earnings tax increase dominates the expected direct effect of reduced net wages on work hours, as was the case with the AFDC tax. For others, the reverse appears to be the case.

While we do not go into the same level of detail for changes in other program parameters, there are important highlights. The AFDC tax on unearned income (r_A) has virtually no effect on hours of work, except for less than a quarter of rural and urban households. The FSP's corollary tax (r_F) has somewhat more of an effect, albeit small. Within each subsample the elasticities range from negative to positive.

The patterns and magnitudes of the hours elasticities with respect to the values of households' guaranteed maximum program benefits, GPRIMEA (G'_A) and GPRIMEF (G'_F) are interesting. Holding program participation constant, one would expect increases in benefits increase to reduce hours of work if leisure is a normal good. Also, increases in guaranteed benefits may increase program participation and indirectly further reduce hours of work. As shown in Table 2, except for rural AFDC participation, increased guaranteed benefits generally do increase participation in both equations.

AFDC's benefits enter the hours functions positively through GAP and negatively through GFDPP. Those effects in combination with the indirect participation effects translate into negative mean hour elasticities for all single mothers. The rural, suburban and urban hours elasticities with respect to a ten percent increase in AFDC benefits are –0.39, -0.55 and –0.63 and generate reductions of 0.08, 0.14 and 0.12 hours of work per week on average, respectively. Even so, the elasticity distributions show that the AFDC guaranteed benefit has no effect for some rural and urban households. For other rural and possibly other urban households AFDC, benefits have a small but positive effect on work hours.

FSP benefits enter the hours function directly through GFDPP. Recall from Table 2 that GFDPP coefficients are all insignificant and only the rural coefficient is negative. FSP benefits positively, though insignificantly, affect program participation by all single mother households. Together, these direct and indirect effects generate negative mean elasticities for rural and urban households of –1.52 and –0.65, respectively, and a positive mean elasticity for urban households of 0.71. On average, weekly hours of work by rural, suburban and urban single mothers change by -0.35, -0.16 and 0.14, respectively, when GPRIMEA increases by 10 percent.

Based upon the distributions of GPRIMEF elasticities, most or all of the suburban elasticities are negative while those for urban households are positive. For rural households, they range from strongly negative to zero. Thus, rural and suburban elasticities with respect to FS benefits behave as expected. But, the urban elasticities are counterintuitive. Given FSP benefits' insignificance in both the hours and participation equations, perhaps the urban elasticities should be given little credence. It is more likely that they are, in fact, zero.

Single mothers' labor supply responses to changes in program parameters as measured by the mean elasticities as well as their distributions in Table 4, have interesting policy implications. As a means for summarizing the effects of policy changes on single mothers' labor supply; average changes in weekly hours of work derived from the calculated elasticities are presented in Table 5. As the table indicates, responses to program taxes on unearned income (r_A and r_F) are quite small, with the exception of rural households' response to AFDC's tax, and predominantly positive in response to FSP's tax. Most households increase earnings to make up for benefit reductions associated with increased taxes on unearned income.

Ten-percent increases in AFDC's and FSP's earnings taxes (t_A and t_F) generate opposite effects on single mothers' hours of work. The positive AFDC responses may arise because the program becomes less attractive to some households or because others become ineligible. Hence, those single mothers increase their labor supply. For the negative FSP responses, the increase in the tax and its associated reduction in the return

Table 5: Weekly Hours of Work Changes as Policy Parameters Change

Policy Parameter	Rural	Suburban	Urban
t_A	0.12	0.07	0.11
t_F	-0.03	-0.63	-0.04
r_A	0.11	0.00	0.01
r_F	0.02	0.06	-0.02
GPRIMEA	-0.08	-0.14	-0.12
GPRIMEF	-0.35	-0.16	0.14

Note: These are not conventional elasticities. These reflect the percent change in work hours from a *ten* percent change in the policy

to work may outweigh any indirect effects due to reductions in FSP participation. Rural and urban single mothers respond similarly to both tax changes. Suburban mothers respond quite differently, particularly in their very strong negative response to increases in food stamp earnings taxes.

With one exception, all households reduce hours of work when AFDC and FSP guaranteed benefits, GPRIMEA and GPRIMEF, increase by ten percent. For the AFDC benefit increase, rural single mothers reduce labor supply the least and suburban mothers the most, 0.08 and 0.14 hours per week, respectively. In contrast, rural single mothers have the largest reduction in hours when FSP's guarantee increases (0.35), followed by suburban mothers' reduction (0.16). Urban households increase their labor supply when food stamp benefits increase.

D. Summary

In this section we have utilized two different techniques for understanding how rural, suburban and urban single mothers and their households respond to changes in AFDC and FSP program parameters. For our participation analysis we illustrated how a representative single mothers' household would respond to program parameter changes if it was transformed from a rural, to a suburban and than to an urban household. This allowed us to distill from the bivariate probit estimates the basic differences between rural, suburban and urban program participation choices probabilities as programs parameters changed. To analyze how rural, suburban and urban single mothers' hours of work change as program parameters change we calculated arc elasticities of labor supply with respect to changes in each program parameter. Our elasticity calculations crucially allowed program participation to vary as well as direct responses to program parameter changes.

Both analytical methods add to our understanding of how program parameters can be set or changed to meet various policy objects with respect to low-income single mothers and their families. In particular we were able to highlight similarities and important differences between how rural suburban and urban single parents and their families might be affected by and respond to changes in safety net programs. These highlights will be of use to state policymakers as they evaluate and/or redesign cash welfare programs for their own state residents.

VI. SUMMARY AND CONCLUSIONS

This study is unique. It provides information and analyses regarding rural, suburban and urban single mothers' AFDC, FSP and labor force participation decisions. Others studies extensively explore the linkages between AFDC or negative income tax cash transfer programs and labor supply and only two other studies addresses single mothers' joint decisions regarding FSP, AFDC and labor supply. Until now, no one has explored whether and how rural, suburban and urban differentially respond to those programs and to labor market conditions.

To do so, data are utilized that are not normally available for public use, the in-house version of the Census Bureau's 1984 Panel of the Survey of Income and Program Participation, which allows accurate identification of where surveyed households reside. The focus is on SIPP's single mother households because they are most at risk of poverty and need for support from state and Federal safety net programs.

This study has four basic components. First, poverty status, AFDC and FSP participation choices, and labor supply patterns of rural, suburban and urban single mothers are described. Particular attention is paid to the characteristics of those mothers and their households that may explain differences in program participation and labor supply. Second, a microeconomic theoretical framework is developed as a means for understanding the interlinked AFDC, FSP and labor supply decisions. Third, that theoretical model provides the foundation for developing an econometric model of those decisions. The model is estimated separately for rural, suburban and urban households. The estimates are used to highlight determinants of single mothers' program participation and labor supply and how those determinants differ for rural, suburban and urban single mothers and their households. Finally, we consider the effects of several program parameters, the basic building blocks for designing cash and in-kind transfer programs. We utilize the econometric estimates to analyze how changes in AFDC and FSP program parameters affect rural, urban and suburban single mothers' program participation and hours of work. The purpose of this exercise is to inform state decision-makers regarding how to evaluate or restructure their own cash welfare programs under TANF operating in tandem with the Federal food stamp program.

From our descriptive analysis we learn that urban households are most likely to be in poverty and to participate in AFDC and the FSP and least likely to be in the labor force. The opposite is true for suburban households with rural households somewhere in between. Of working single mothers, however, rural households have the highest overall program participation and rely most heavily on the FSP and least on AFDC. Some single mother households from all areas and particularly those in rural areas continue to be eligible for and receive food stamps or AFDC benefits even though they are working more than full time. Thus, even with extraordinary work effort, these mothers' earnings are insufficient to pull their households out of poverty or near poverty.

The theoretical model of utility maximization shows that program participation decisions depend upon comparisons of utility gains on and off the programs. Labor supply is shown to be a function of net market wages (net of program taxes), guaranteed program benefits, unearned income and endogenous program participation.

The econometric model involves two linked components. The first is bivariate probit estimation of the AFDC and FSP participation decision. Bivariate estimation is necessary to account for possible correlation between the error terms of the participation equations. Those participation estimates are linked to the second component, estimation of the hours equation, due to the endogeneity of the participation decisions. The participation estimates are used to calculate endogeneity or sample selection correction factors, which are included as auxiliary variables in the hours equations. This approach allows estimation of continuous hours functions. The bivariate probit estimates show significant positive correlation between the error terms of the participation equations, indicating that bivariate rater than univariate estimation is appropriate. The method of correcting for endogenous participation in the hours equations, however, yields mixed results with unexpected significant positive hours equation coefficients for the AFDC-related auxiliary variable. Nonetheless, the participation and hours equation estimates reasonably explain variation in AFDC, FSP and hours of work decisions.

From the coefficient estimates we learn that the size of FSP and AFDC benefits generally increase participation in their respective programs. However, these effects are significant only for suburban and urban responses to AFDC benefits. The differences in wage rates on and off the programs have significant positive affects on participation. That is, wage rates single mothers can garner and/or program earnings taxes they face significantly affect program participation. In the hours equation, net wages have significant positive effects on hours of work. That is, as net wage rates increase, hours of work increase.

From this analysis of rural, suburban and urban single mothers' participation responses to changes in program parameters, we learn that all the parameters affect rural and urban participation choices similarly. As program parameter changes make programs more or less attractive, rural and urban households shift into and away from those programs, respectively, in a similar fashion. Notably, given favorable program parameters, rural and urban households' predominantly choose participation in both programs. As one program parameter changes, they predominantly shift to participation in the other program only rather than overall nonparticipation. In contrast, regardless of which parameter changes, suburban households predominantly choose no program participation, although some do exhibit similar though smaller responses to those of their urban and rural counterparts.

Compared to the participation effects, some program parameters have more complex and, in some cases, counterintuitive effects on hours of work. The taxes on unearned income have virtually no effect on hours of work regardless of where the single mother resides. For earnings taxes, rural and urban single mothers increase labor supply when AFDC's tax increases and do so by more than suburban single mothers do. In contrast, they decrease their labor supply much less than suburban single mothers when FSP's tax increases. In the case of guaranteed benefits virtually all single mothers reduce their labor supply as benefits increase. Rural single mothers have the strongest reduction in labor supply when food stamp benefits increase.

Results such as these are particularly timely because our separate analyses of rural, suburban and urban single mothers' program participation and labor supply behaviors can inform state policymakers. To the extent that a particular state is largely rural, for example, the rural results should be of particular interest. Or, if states have varying proportions of rural, suburban and urban single mother households, they need to understand how such households differentially respond to particular program parameters and take such differences into account, to the extent possible, as they redesign and evaluate the effectiveness of their TANF programs.

This research project leaves many questions unanswered as do all such projects. Technical questions remain regarding the best way to capture linkages between programs and estimate continuous labor supply functions with endogenous participation. Alternative methods should be pursued. When data are available in a year or two it would be enlightening to replicate this study and see how rural, suburban and urban single mothers and their families fare under full implementation of some welfare reform, when single mothers reach their 5-year lifetime limit on TANF benefits and when we observe the economy going into and perhaps out of a recession.

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APPENDIX A

Statistics for Differences Between Rural

Suburban and Urban Variable Means

Table A1: T-statistics for the Differences Between Variable Means by Residence

	Rural Urban	Rural Suburb	Urban Suburb
Continuous Variables			
AGE	0.613	-0.936	-1.864 **
ED	0.086	-2.415 ***	-2.833 ***
DISABLED	0.114	1.049	1.129
FAMSIZE	-1.233	0.221	1.680 **
NADULTS	-0.849	-0.632	0.224
KIDS05	-0.714	2.233 **	3.546 ***
KIDS610	-0.666	0.236	1.059
KIDS1117	-0.146	-1.334 *	-1.409 *
TENURE	4.744 ***	-2.093 **	-8.016 ***
WDUM	2.402 ***	-1.670 **	-4.752 ***
TOTHRS	-0.321	-0.671	-0.446
WAGE	0.130	-0.356	-1.571 *
EARNED	-0.214	-3.357 **	-4.115 ***
UNEARNED	1.583 *	-5.104 **	-6.882 ***
CHLDSUPT	4.271 ***	-0.606	-5.677 ***
CSUPTAMT	-1.748 **	-5.412 ***	-2.946 ***
FPART	-0.840	4.930 ***	6.947 ***
FSBEN	2.187 **	3.356 ***	1.809 **
APART	-3.124 ***	1.982 **	5.971 ***
AFDCBEN	-4.684 ***	-4.967 ***	-1.159
UNRATE	4.899 ***	2.893 ***	-2.446 ***
Categorical Variables			
BLACK	-8.032 ***	0.997	10.307 ***
ORACE	-0.937	-2.997 ***	-2.357 ***
SEP	-1.854 **	-0.231	1.819 **
DIV	5.299 ***	0.599	-5.348 ***
NEVERMAR	-6.305 ***	-1.155	5.539 ***
SOUTH	2.990 ***	4.008 ***	1.344 *
MIDWEST	0.141	1.141	1.202
NOREAST	-3.478 ***	-3.925 ***	-0.701

* Indicates significance at α=0.10, one-tailed test
** Indicates significance at α=0.05, one-tailed test
***Indicates significance at α=0.01, one-tailed test

Source: Survey of Income and Program Participation, 1984 Panel, Third Wave

APPENDIX B

Calculations of AFDC Benefit

APPENDIX B

Calculations of AFDC Benefit

All states' AFDC benefit formulae at zero hours of work can be described by the following:

(B1) $G'_A = \text{minimum}\{[PAYSTD - r_A N], [AFDCMAX]\}$,

where PAYSTD is the state's monthly payment standard, r_A is the state's tax on unearned income and AFDCMAX is the state's maximum allowable benefit (Graham and Beller, p. 683). For each state, PAYSTD and AFDCMAX increase as family size increases but r_A does not. The sources for the state-level AFDC maximum benefit and payment standards are Tables 6 and 7 (pp. 299-301) from the *1984 Green Book* of the U.S. House of Representatives Committee on Ways and Means. The source for state-level information on unearned income tax rates is the U.S. Department of Health and Human Services (1985).

The AFDC tax rate on earnings, t_A, follows a particular pattern regardless of the state. If the mother has worked continuously for four months or less, $t_A = 0.67$. If she has worked more than four months, $t_A = 1$. Fortunately, the SIPP data allow us to check how many months each mother worked up to the week of the interview, so, t_A takes the value of 0.67 or 1, depending upon her recent work history.

APPENDIX C

Calculation of FSP Benefits

Appendix C

FSP Benefit Calculations

The full complex FSP benefit calculation regime is ably described by Fraker and Moffitt (p.27) as:

$$\text{(C1)} \quad B_F = \max [M, G_F - r_F Y_n], \qquad \text{if } Y_n \leq Y^* \text{ and } wH + N \leq 1.3Y^*,$$

$$= 0, \qquad \text{if } Y_n > Y^* \text{ or } wH + N > 1.3Y^*,$$

$$\text{(C2)} \quad Y_n = \max [0, wH + N - (e_F wH + D_F + S_F)],$$

$$\text{(C3)} \quad S = \min [S_{cap}, \max (0, R - t_S Y_m)],$$

$$\text{(C4)} \quad Y_m = \max [0, wH + N - (e_F wH + D_F)],$$

where B_F is the Food Stamp benefit, M is the minimum benefit, G_F is the guarantee if the household has no other resources, r_F is the FSP tax on income (earned or unearned), Y_n is net Food Stamp income, Y* is the poverty line, w is the wage, H is hours of work, N is other household income (unearned), e_F is the earned income disregard, D_F is the standard deduction, S_F is the shelter deduction, S_{cap} is the cap on the value of the shelter deduction, t_S is the shelter deduction tax on the program's intermediate net income, Y_m.

The actual steps for determining FSP benefits starts with (C4), calculating intermediate net income for the purposes of setting the shelter deduction in (C3). That, in turn is used in (C2) to calculate food stamp net income, Y_n. The value of Y_n is then compared to the poverty line. If food stamp net income (Y_n) is greater than the poverty line or if gross income (wH + N) is greater than 130 percent of the poverty line as in (C1), the household is not eligible for food stamps and the benefit is zero. If both income values are less than their respective proportions of the poverty line, then, the benefit is calculated as in (C1). Note that if the household is eligible, though barely so, they will receive the minimum benefit (M).

As mentioned in the discussion of our theoretical framework in section III, we simplify the benefit calculation for a practical reason, rent or mortgage data are not available. We, therefore, assume the shelter deduction is fixed at the maximum (S_{cap}). In 1984, the shelter deduction caps were $218, $180 and $125 in Alaska, Hawaii and all other states, respectively. Similarly, the standard deduction (D_F) was $89 in all states except Alaska ($152) and Hawaii ($126). The values of r_F, e_F and t_S were 0.3, 0.18, and 0.5, respectively. The source for this information is page 631 of the *1984 Green Book* of the U.S. Hours of Representatives Committee on Ways and Means.

For our FSP program participation and hours equations, the variables of interest are the single mother's guarantee at zero hours of work given her unearned income, G'_F, the tax rate on unearned income, $r_{F,}$ and the tax on earnings t_F. These variables are set or calculated for each household as follows:

$r_{F,} = 0.3$,

$t_F = r_F(1 - e_F) = 0.3(1 - 0.18) = 0.246$ and

$G'_F = G_F - r_F(N - D_F - S_F) = G_F - 0.3(N - \$224)$,

for all states except Alaska and Hawaii where the standard deduction and shelter deduction caps are higher as indicated above. As in (C1), the minimum benefit replaces the calculated G'_F if the household is net and gross income eligible and the calculated benefit would be lower than the minimum.

APPENDIX D

Wage Estimation Results from Heckman's Two-Step Sample Selection Correction Procedure for Rural, Suburban and Urban Single Parents

Table D1: Rural Model: Wage Model, Estimated Using Heckman's Two-Step Method to Correct for Sample Selection Bias

Step One: Probit Model of Labor Participation

Variable	Coef.	S.E.	t-stat.	p-level	Mean of X
Constant	-1.2331	1.0297	-1.1980	0.2311	
ED	0.1010	0.0352	2.8710	0.0041	11.3145
AGE	0.0324	0.0416	0.7780	0.4366	37.0920
AGESQ	-0.0005	0.0005	-1.0020	0.3163	1521.9585
BLACK	0.0666	0.2335	0.2850	0.7756	0.2433
UNRATE	-0.0512	0.0342	-1.4970	0.1345	8.1448
MIDWEST	0.1137	0.2473	0.4600	0.6456	0.2760
NOREAST	0.2756	0.2981	0.9240	0.3553	0.1306
SOUTH	0.3011	0.2552	1.1800	0.2381	0.4481
KIDS05	-0.3057	0.1125	-2.7180	0.0066	0.6113
KIDS610	-0.0662	0.1070	-0.6190	0.5357	0.5015
KIDS1117	-0.0262	0.0904	-0.2900	0.7721	0.9110
UNEARNED	-0.0005	0.0002	-2.4470	0.0144	303.7656
SEP	0.1561	0.2813	0.5550	0.5790	0.1958
DIV	0.4305	0.2455	1.7540	0.0795	0.5104
NEVERMAR	-0.3203	0.3369	-0.9510	0.3418	0.1157
NADULTS	0.1205	0.1022	1.1780	0.2387	1.4985
DISABLED	-1.1411	0.2342	-4.8730	0.0000	0.1424
TENURE	0.4980	0.1800	2.7670	0.0057	0.4243
Observations=	337				
Log Likelihood=	-185.7084				
Log Likelihood_0=	-229.4056				

Step Two: Sample Selection Model (Two Stage Least Squares Estimates)

Variable	Coef.	S.E.	t-stat.	p-level	Mean of X
Constant	1.2887	0.5664	2.2750	0.0229	
ED	0.0472	0.0199	2.3690	0.0178	11.9333
AGE	0.0067	0.0204	0.3270	0.7440	36.2256
AGESQ	0.0000	0.0002	-0.1880	0.8506	1418.2256
BLACK	0.0238	0.1119	0.2130	0.8314	0.2154
UNRATE	0.0081	0.0173	0.4690	0.6394	8.0179
MIDWEST	-0.2638	0.1320	-1.9990	0.0456	0.2821
NOREAST	-0.3795	0.1512	-2.5090	0.0121	0.1487
SOUTH	-0.4125	0.1414	-2.9170	0.0035	0.4359
LAMBDA	-0.3751	0.1423	-2.6350	0.0084	0.5395
Observations=	195				
Log Likelihood=	-138.0060				
Log Likelihood_0=	-164.0347				

Table D2: Suburban Model: Wage Model, Estimated Using Heckman's Two-Step Method to Correct for Sample Selection Bias

Step One: Probit Model of Labor Participation

Variable	Coef.	S.E.	t-stat.	p-level	Mean of X
Constant	-2.5250	0.9176	-2.7520	0.0059	
ED	0.1173	0.0265	4.4190	0.0000	11.7900
AGE	0.1404	0.0422	3.3250	0.0009	37.8593
AGESQ	-0.0018	0.0005	-3.5860	0.0003	1556.1175
BLACK	0.0194	0.1803	0.1080	0.9143	0.2139
UNRATE	-0.0915	0.0381	-2.3980	0.0165	7.7129
ORACE	-0.0848	0.3629	-0.2340	0.8152	0.0385
MIDWEST	-0.0875	0.2047	-0.4280	0.6689	0.2408
NOREAST	-0.0303	0.2060	-0.1470	0.8830	0.2331
SOUTH	0.0452	0.1938	0.2330	0.8154	0.3121
KIDS05	-0.3010	0.1033	-2.9140	0.0036	0.4875
KIDS610	-0.2326	0.0932	-2.4950	0.0126	0.4894
KIDS1117	-0.1145	0.0824	-1.3900	0.1645	1.0019
UNEARNED	-0.0005	0.0001	-4.0020	0.0001	486.2601
SEP	-0.0818	0.2366	-0.3460	0.7294	0.2023
DIV	0.1773	0.2079	0.8530	0.3938	0.4894
NEVERMAR	-0.2648	0.2719	-0.9740	0.3301	0.1426
NADULTS	0.1074	0.0867	1.2390	0.2155	1.5376
DISABLED	-1.3768	0.2160	-6.3740	0.0000	0.1175
TENURE	0.5702	0.1614	3.5330	0.0004	0.4971
Observations=	519				
Log Likelihood=	-243.7698				
Log Likelihood$_0$=	-340.3474				

Step Two: Sample Selection Model (Two Stage Least Squares Estimates)

Variable	Coef.	S.E.	t-stat.	p-level	Mean of X
Constant	0.6521	0.4813	1.3550	0.1754	
ED	0.0615	0.0125	4.9100	0.0000	12.5879
AGE	0.0369	0.0205	1.8010	0.0717	37.2697
AGESQ	-0.0004	0.0002	-1.7970	0.0723	1466.8758
BLACK	-0.0424	0.0729	-0.5810	0.5610	0.1879
UNRATE	-0.0191	0.0158	-1.2110	0.2258	7.5758
ORACE	-0.0712	0.1426	-0.4990	0.6179	0.0364
MIDWEST	-0.1001	0.0795	-1.2590	0.2081	0.2303
NOREAST	-0.1800	0.0790	-2.2780	0.0227	0.2333
SOUTH	-0.2584	0.0764	-3.3820	0.0007	0.3152
LAMBDA	-0.1375	0.1067	-1.2890	0.1974	0.4139
Observations=	330				
Log Likelihood=	-209.5530				
Log Likelihood$_0$=	-252.3513				

Table D3: Urban Model: Wage Model, Estimated Using Heckman's Two-Step Method to Correct for Sample Selection Bias

Step One: Probit Model of Labor Participation

Variable	Coef.	S.E.	t-stat.	p-level	Mean of X
Constant	-3.2764	0.8700	-3.7660	0.0002	
ED	0.0517	0.0213	2.4220	0.0154	11.2981
AGE	0.1903	0.0402	4.7350	0.0000	36.5947
AGESQ	-0.0024	0.0005	-4.9700	0.0000	1482.6568
BLACK	0.0882	0.1318	0.6690	0.5033	0.4891
UNRATE	-0.0884	0.0355	-2.4880	0.0128	7.4497
ORACE	0.8856	0.5225	1.6950	0.0901	0.0155
MIDWEST	-0.2845	0.1844	-1.5430	0.1228	0.2717
NOREAST	-0.4220	0.1922	-2.1950	0.0281	0.2158
SOUTH	0.1194	0.1805	0.6610	0.5084	0.3494
KIDS05	-0.3627	0.0846	-4.2860	0.0000	0.6506
KIDS610	-0.3193	0.0858	-3.7230	0.0002	0.5342
KIDS1117	-0.1972	0.0650	-3.0330	0.0024	0.9208
UNEARNED	-0.0001	0.0001	-0.7170	0.4732	258.4612
SEP	0.2490	0.2140	1.1640	0.2446	0.2469
DIV	0.4827	0.2058	2.3460	0.0190	0.3354
NEVERMAR	0.0512	0.2278	0.2250	0.8221	0.2717
NADULTS	0.1944	0.0735	2.6440	0.0082	1.5497
DISABLED	-0.9940	0.1826	-5.4430	0.0000	0.1398
TENURE	0.5139	0.1520	3.3800	0.0007	0.2717
Observations=	644				
Log Likelihood=	-329.4686				
Log Likelihood$_0$=	-446.3837				

Step Two: Sample Selection Model (Two Stage Least Squares Estimates)

Variable	Coef.	S.E.	t-stat.	p-level	Mean of X
Constant	0.0234	0.5619	0.0420	0.9668	
ED	0.0447	0.0100	4.4510	0.0000	11.9377
AGE	0.0441	0.0260	1.6970	0.0897	36.6262
AGESQ	-0.0006	0.0003	-1.7890	0.0736	1420.9813
BLACK	0.1139	0.0612	1.8620	0.0627	0.4704
UNRATE	0.0569	0.0172	3.3130	0.0009	7.2103
ORACE	-0.2630	0.1936	-1.3580	0.1743	0.0218
MIDWEST	-0.0485	0.0907	-0.5350	0.5928	0.2243
NOREAST	0.0442	0.0971	0.4550	0.6490	0.1838
SOUTH	-0.1488	0.0828	-1.7960	0.0724	0.4081
LAMBDA	-0.1262	0.0960	-1.3140	0.1887	0.5788
Observations =	321				
Log Likelihood=	-219.1280				
Log Likelihood$_0$=	-253.9321				

APPENDIX E

AFDC and FSP Participation Bivariate Probit Results

and Labor Supply Regression Results for

Rural, Suburban and Urban Single Mothers

Table E1: Rural Model Bivariate Probit Participation Estimates

Variable	Coef.	S.E.	t-stat.	p-level	Mean of X
AFDC Participation Equation					
CONSTANT	3.0676	1.7468	1.7560	0.0791	
GPRIMEAN	-0.7872	1.7086	-0.4610	0.6450	0.1562
UNEARNN	-3.1659	0.9627	-3.2880	0.0010	0.3038
NEGWTSA	6.2186	1.6611	3.7440	0.0002	-0.5055
KIDS05N	6.9012	2.1322	3.2370	0.0012	0.0611
KIDS610N	2.1124	1.8504	1.1420	0.2536	0.0501
KIDS17N	4.1529	1.8984	2.1880	0.0287	0.0911
NADULTSN	3.7171	1.6530	2.2490	0.0245	0.1499
DIV	-0.2896	0.4771	-0.6070	0.5439	0.5104
SEP	0.1732	0.4965	0.3490	0.7272	0.1958
NEVERMAR	0.7818	0.6218	1.2570	0.2086	0.1157
BLACK	-0.0664	0.3911	-0.1700	0.8652	0.2433
MIDWEST	-0.8252	0.4952	-1.6660	0.0956	0.2760
NOREAST	-1.5701	0.5261	-2.9850	0.0028	0.1306
SOUTH	-2.4300	0.6943	-3.5000	0.0005	0.4481
TENURE	-0.6732	0.4122	-1.6330	0.1024	0.4243
UNRATEN	0.9873	0.6589	1.4980	0.1341	0.8145
DISABLED	0.9122	0.4005	2.2780	0.0227	0.1424
EDN	-3.5929	10.4523	-0.3440	0.7310	0.1131
AGEN	-1.1611	1.6904	-0.6870	0.4922	0.3709
Food Stamp Program Participation					
CONSTANT	3.2844	4.2059	0.7810	0.4349	
GPRIMEFN	2.2304	3.2728	0.6810	0.4956	0.1724
UNEARNN	-0.3975	0.7376	-0.5390	0.5900	-0.3038
NEGWTSF	26.9784	39.8451	0.6770	0.4984	-0.1466
KIDS05N	3.0604	2.0071	1.5250	0.1273	0.0611
KIDS610N	2.3562	1.7040	1.3830	0.1668	0.0501
KIDS17N	1.2525	1.7732	0.7060	0.4799	0.0911
NADULTSN	-0.9893	2.0453	-0.4840	0.6286	0.1499
DIV	0.1438	0.2987	0.4810	0.6302	0.5104
SEP	0.2737	0.3477	0.7870	0.4312	0.1958
NEVERMAR	0.3677	0.3732	0.9850	0.3245	0.1157
BLACK	0.3112	0.2758	1.1280	0.2592	0.2433
MIDWEST	-1.4586	1.8793	-0.7760	0.4377	0.2760
NOREAST	-1.5238	2.5126	-0.6060	0.5442	0.1306
SOUTH	-2.1641	2.6579	-0.8140	0.4155	0.4481
TENURE	-0.4018	0.1894	-2.1210	0.0339	0.4243
UNRATEN	0.6507	0.5599	1.1620	0.2452	0.8145
DISABLED	0.9458	0.2721	3.4760	0.0005	0.1424
EDN	3.7039	25.3492	0.1460	0.8838	0.1131
AGEN	0.8918	1.8193	0.4900	0.6240	0.3709
Disturbance Correlation					
RHO(1,2)	0.5987	0.1513	3.9570	0.0001	
Observations=	337				

Table E2: Rural Model Total Hours Least Squares Estimates

Avg. Total Hours Worked: 22.3917

Variable	Coef.	S.E.	t-stat.	p-level	Mean of X	Elasticity
Constant	0.5976	7.8140	0.0760	0.9391		
KIDS05	2.4120	1.6286	1.4810	0.1396	0.6113	0.0658
KIDS610	1.9793	1.4478	1.3670	0.1726	0.5015	0.0443
KIDS1117	4.2938	1.2363	3.4730	0.0006	0.9110	0.1747
NADULTS	2.4040	1.2174	1.9750	0.0492	1.4985	0.1609
BLACK	-1.8064	2.8296	-0.6380	0.5237	0.2433	-0.0196
DIV	4.8777	2.7306	1.7860	0.0750	0.5104	0.1112
SEP	2.8839	3.1648	0.9110	0.3628	0.1958	0.0252
NEVERMAR	2.8967	3.9299	0.7370	0.4616	0.1157	0.0150
MIDWEST	7.3901	3.1917	2.3150	0.0212	0.2760	0.0911
NOREAST	7.8235	3.7244	2.1010	0.0365	0.1306	0.0456
SOUTH	6.6104	3.5374	1.8690	0.0626	0.4481	0.1323
DISABLED	-7.2536	3.0034	-2.4150	0.0163	0.1424	-0.0461
UNRATE	-0.6887	0.4071	-1.6920	0.0917	8.1448	-0.2505
NETWAGE	4.1077	0.7901	5.1990	0.0000	4.2129	0.7729
GAP	-0.0321	0.0126	-2.5500	0.0112	66.9644	-0.0961
GFDPP	-0.0107	0.0201	-0.5310	0.5960	75.2582	-0.0358
UNEARNED	-0.0160	0.0030	-5.4030	0.0000	303.7656	-0.2175
l_{AA}	10.7430	2.4348	4.4120	0.0000	0.0000	0.0000
l_{FF}	-0.9092	2.2285	-0.4080	0.6836	0.0000	0.0000
Observations=	337.0000					
R^2=	0.4299					

Table E3: Suburban Model Bivariate Probit Participation Estimates

Variable	Coef.	S.E.	t-stat.	p-level	Mean of X
AFDC Participation Equation					
CONSTANT	0.8861	1.0916	0.8120	0.4169	
GPRIMEAN	2.0783	0.9342	2.2250	0.0261	0.1745
UNEARNN	-0.9592	0.3524	-2.7220	0.0065	0.4863
NEGWTSA	5.7664	1.2910	4.4670	0.0000	-0.5324
KIDS05N	4.0692	1.8678	2.1790	0.0294	0.0487
KIDS610N	0.7616	1.8302	0.4160	0.6773	0.0489
KIDS17N	1.6767	1.5263	1.0990	0.2719	0.1002
NADULTSN	2.2059	1.2115	1.8210	0.0686	0.1538
DIV	0.3117	0.3987	0.7820	0.4343	0.4894
SEP	0.6671	0.4107	1.6250	0.1043	0.2023
NEVERMAR	0.3436	0.4633	0.7420	0.4582	0.1426
BLACK	-0.2506	0.3304	-0.7580	0.4482	0.2139
ORACE	0.0535	1.7370	0.0310	0.9754	0.0385
MIDWEST	-0.7189	0.3239	-2.2190	0.0265	0.2408
NOREAST	-1.6503	0.4643	-3.5540	0.0004	0.2331
SOUTH	-1.3603	0.4637	-2.9340	0.0034	0.3121
TENURE	-0.7670	0.3085	-2.4860	0.0129	0.4971
UNRATEN	-0.4299	0.7911	-0.5430	0.5868	0.7713
DISABLED	0.7822	0.3156	2.4790	0.0132	0.1175
EDN	10.3792	5.6020	1.8530	0.0639	0.1179
AGEN	-0.0153	1.3131	-0.0120	0.9907	0.3786
Food Stamp Participation Equation					
CONSTANT	3.3653	1.1839	2.8430	0.0045	
GPRIMEFN	2.3636	3.4011	0.6950	0.4871	0.1458
UNEARNN	-0.5709	0.7366	-0.7750	0.4383	0.4863
NEGWTSF	35.0379	9.6162	3.6440	0.0003	-0.1485
KIDS05N	2.2829	2.0674	1.1040	0.2695	0.0487
KIDS610N	2.4749	1.7376	1.4240	0.1544	0.0489
KIDS17N	2.7934	1.7747	1.5740	0.1155	0.1002
NADULTSN	-2.6241	2.1264	-1.2340	0.2172	0.1538
DIV	0.3675	0.3756	0.9790	0.3278	0.4894
SEP	0.5521	0.3716	1.4860	0.1373	0.2023
NEVERMAR	0.6932	0.4086	1.6970	0.0898	0.1426
BLACK	-0.2994	0.2239	-1.3370	0.1813	0.2139
ORACE	-0.5402	0.7883	-0.6850	0.4931	0.0385
MIDWEST	-0.5154	0.2891	-1.7820	0.0747	0.2408
NOREAST	-0.9507	0.3576	-2.6590	0.0078	0.2331
SOUTH	-1.4563	0.4389	-3.3180	0.0009	0.3121
TENURE	-0.7778	0.2158	-3.6040	0.0003	0.4971
UNRATEN	-0.2548	0.5098	-0.5000	0.6172	0.7713
DISABLED	0.7854	0.2512	3.1260	0.0018	0.1175
EDN	14.0852	7.8144	1.8020	0.0715	0.1179
AGEN	-0.2165	1.0814	-0.2000	0.8413	0.3786
Disturbance Correlation					
RHO(1,2)	0.8151	0.0831	9.8090	0.0000	
Observations=	519				

Table E4: Suburban Model Total Hours Least Squares Estimates

Avg. Total Hours Worked: 22.3917

Variable	Coef.	S.E.	t-stat.	p-level	Mean of X	Elasticity
Constant	9.4308	5.5992	1.6840	0.0921		
KIDS05	-1.0896	1.2641	-0.8620	0.3887	0.4875	-0.0237
KIDS610	-1.2091	1.1033	-1.0960	0.2731	0.4894	-0.0264
KIDS1117	-0.2634	0.9749	-0.2700	0.7870	1.0019	-0.0118
NADULTS	1.3188	0.8389	1.5720	0.1160	1.5376	0.0906
BLACK	-0.2992	1.9684	-0.1520	0.8792	0.2139	-0.0029
ORACE	5.7327	3.8310	1.4960	0.1346	0.0385	0.0099
DIV	8.5506	2.0934	4.0850	0.0000	0.4894	0.1869
SEP	6.6275	2.4798	2.6730	0.0075	0.2023	0.0599
NEVERMAR	4.1019	2.8228	1.4530	0.1462	0.1426	0.0261
MIDWEST	0.6110	2.1874	0.2790	0.7800	0.2408	0.0066
NOREAST	-2.4651	2.2227	-1.1090	0.2674	0.2331	-0.0257
SOUTH	2.0103	2.2463	0.8950	0.3708	0.3121	0.0280
DISABLED	-10.9377	2.3528	-4.6490	0.0000	0.1175	-0.0574
UNRATE	-0.5483	0.4120	-1.3310	0.1832	7.7129	-0.1889
NETWAGE	3.8075	0.5305	7.1780	0.0000	4.8028	0.8167
GAP	-0.0143	0.0076	-1.8830	0.0596	74.0597	-0.0474
GFDPP	0.0116	0.0163	0.7100	0.4774	37.9788	0.0197
UNEARNED	-0.0078	0.0014	-5.7770	0.0000	486.2601	-0.1701
l_{AA}	7.9836	1.8328	4.3560	0.0000	0.0000	0.0000
l_{FF}	-2.5662	1.7140	-1.4970	0.1343	0.0000	0.0000
Observations=	519					
R^2=	0.4305					

Table E5: Urban Model Bivariate Probit Participation Estimates

Variable	Coef.	S.E.	t-stat.	p-level	Mean of X
AFDC Participation Equation					
Constant	-1.0204	0.7773	-1.3130	0.1893	
GPRIMEAN	2.1794	0.6990	3.1180	0.0018	0.2397
UNEARNN	-1.4737	0.5431	-2.7140	0.0067	0.2585
NEGWTSA	5.2193	0.9734	5.3620	0.0000	-0.4724
KIDS05N	3.7959	0.8713	4.3570	0.0000	0.0651
KIDS610N	2.6200	1.2119	2.1620	0.0306	0.0534
KIDS17N	0.8303	0.8473	0.9800	0.3271	0.0921
NADULTSN	1.7372	0.9867	1.7610	0.0783	0.1550
DIV	0.4472	0.2969	1.5060	0.1320	0.3354
SEP	0.2568	0.2918	0.8800	0.3789	0.2469
NEVERMAR	0.5477	0.2954	1.8540	0.0637	0.2717
BLACK	0.5698	0.1846	3.0870	0.0020	0.4891
ORACE	-1.7049	1.0402	-1.6390	0.1012	0.0155
MIDWEST	0.3098	0.2852	1.0860	0.2775	0.2717
NOREAST	-0.3085	0.2822	-1.0930	0.2743	0.2158
SOUTH	-0.2845	0.3145	-0.9050	0.3657	0.3494
TENURE	-0.6348	0.2069	-3.0690	0.0022	0.2717
UNRATEN	0.9831	0.4639	2.1190	0.0341	0.7450
DISABLED	0.4350	0.2374	1.8320	0.0669	0.1398
EDN	6.7339	3.7639	1.7890	0.0736	0.1130
AGEN	-0.0156	0.9304	-0.0170	0.9867	0.3659
Food Stamp Participation Equation					
Constant	0.0124	0.5958	0.0210	0.9834	
GPRIMEFN	2.8058	2.1717	1.2920	0.1964	0.1902
UNEARNN	-0.4452	0.3983	-1.1180	0.2636	0.2585
NEGWTSF	10.0929	5.9128	1.7070	0.0878	-0.1408
KIDS05N	3.8131	1.4052	2.7140	0.0067	0.0651
KIDS610N	2.2556	1.3387	1.6850	0.0920	0.0534
KIDS17N	0.7891	1.1789	0.6690	0.5033	0.0921
NADULTSN	-1.4763	1.3686	-1.0790	0.2807	0.1550
DIV	0.0645	0.2296	0.2810	0.7787	0.3354
SEP	0.0865	0.2361	0.3660	0.7140	0.2469
NEVERMAR	0.4626	0.2467	1.8750	0.0608	0.2717
BLACK	0.3559	0.1778	2.0020	0.0453	0.4891
ORACE	-1.0045	0.6579	-1.5270	0.1268	0.0155
MIDWEST	0.4651	0.2102	2.2130	0.0269	0.2717
NOREAST	0.6251	0.2201	2.8400	0.0045	0.2158
SOUTH	-0.1873	0.2319	-0.8070	0.4194	0.3494
TENURE	-0.5550	0.1594	-3.4830	0.0005	0.2717
UNRATEN	1.0495	0.5721	1.8340	0.0666	0.7450
DISABLED	0.4342	0.1875	2.3150	0.0206	0.1398
EDN	-2.4800	4.5156	-0.5490	0.5829	0.1130
AGEN	-0.8748	0.8570	-1.0210	0.3073	0.3659
Disturbance Correlation					
RHO(1,2)	0.7868	0.0498	15.8110	0.0000	
Observations=	644				

Table E6: Urban Model Total Hours Least Squares Estimates

Avg. Total Hours Worked: 19.1413

Variable	Coef.	S.E.	t-stat.	p-level	Mean of X	Elasticity
Constant	9.9509	3.9675	2.5080	0.0121		
KIDS05	-1.6281	1.0032	-1.6230	0.1046	0.6506	-0.0553
KIDS610	-1.1799	0.9896	-1.1920	0.2331	0.5342	-0.0329
KIDS1117	0.1745	0.7446	0.2340	0.8147	0.9208	0.0084
NADULTS	3.2113	0.6837	4.6970	0.0000	1.5497	0.2600
BLACK	0.2994	1.2810	0.2340	0.8152	0.4891	0.0077
ORACE	13.3497	4.6244	2.8870	0.0039	0.0155	0.0108
DIV	9.7297	1.9120	5.0890	0.0000	0.3354	0.1705
SEP	5.2055	1.9890	2.6170	0.0089	0.2469	0.0671
NEVERMAR	5.8634	2.0590	2.8480	0.0044	0.2717	0.0832
MIDWEST	-0.8310	1.8600	-0.4470	0.6550	0.2717	-0.0118
NOREAST	-6.8663	1.8899	-3.6330	0.0003	0.2158	-0.0774
SOUTH	1.5008	1.8428	0.8140	0.4154	0.3494	0.0274
DISABLED	-7.6815	1.7097	-4.4930	0.0000	0.1398	-0.0561
UNRATE	-1.8879	0.3567	-5.2920	0.0000	7.4497	-0.7348
NETWAGE	4.5180	0.5000	9.0360	0.0000	3.5946	0.8484
GAP	-0.0015	0.0053	-0.2730	0.7845	126.9115	-0.0096
GFDPP	0.0139	0.0121	1.1510	0.2495	70.3773	0.0510
UNEARNED	-0.0057	0.0015	-3.7050	0.0002	258.4612	-0.0765
l_{AA}	3.0040	1.4346	2.0940	0.0363	0.0000	0.0000
l_{FF}	-4.6800	1.3703	-3.4150	0.0006	0.0000	0.0000
Observations=	644					
R^2=	0.5328					

APPENDIX F

Marginal Effects for Bivariate Probit

Conditional Mean Functions for

Rural, Suburban and Urban Households

Table F1: Rural Model Marginal Effects for Bivariate Probit Conditional Mean Function, Pr(APART|FPART=1)

Avg. Prob = 0.154282

Variable	Marg. Effect	S.E.	t-stat.	p-level	Mean of X
CONSTANT	0.4982	0.6880	0.7240	0.4690	
GPRIMEA	-0.2105	0.4323	-0.4870	0.6263	0.1562
UNEARN	-0.8078	0.2539	-3.1810	0.0015	0.3038
NEGWTSA	1.6633	0.4664	3.5670	0.0004	-0.5055
KIDS05	1.5456	0.5000	3.0910	0.0020	0.0611
KIDS610	0.3338	0.5053	0.6610	0.5089	0.0501
KIDS17	0.9879	0.5347	1.8480	0.0646	0.0911
NADULTS	1.0913	0.4718	2.3130	0.0207	0.1499
DIV	-0.0916	0.1236	-0.7410	0.4589	0.5104
SEP	0.0195	0.1264	0.1540	0.8775	0.1958
NEVERMAR	0.1730	0.1615	1.0720	0.2839	0.1157
BLACK	-0.0483	0.1007	-0.4800	0.6315	0.2433
MIDWEST	-0.0776	0.2360	-0.3290	0.7423	0.2760
NOREAST	-0.2704	0.2901	-0.9320	0.3512	0.1306
SOUTH	-0.4376	0.3006	-1.4560	0.1454	0.4481
TENURE	-0.1406	0.0981	-1.4330	0.1518	0.4243
UNRATE	0.2002	0.1552	1.2900	0.1972	0.8145
DISABLED	0.1512	0.1033	1.4630	0.1434	0.1424
EDN	-1.3244	3.1563	-0.4200	0.6748	0.1131
AGEN	-0.3981	0.4715	-0.8440	0.3985	0.3709
GPRIMEF	-0.2189	0.3386	-0.6460	0.5181	0.1724
NEGWTSF	-2.6472	4.1103	-0.6440	0.5195	-0.1466

Table F2: Rural Model Marginal Effects for the Bivariate Probit Conditional Mean Function, Pr(FPART|APART=1)

Avg. Prob = 0.864472

Variable	Marg. Effect	S.E.	t-stat.	p-level	Mean of X
CONSTANT	0.4408	1.2293	0.3590	0.7199	
GPRIMEF	0.5881	0.8933	0.6580	0.5103	0.1724
UNEARN	0.3341	0.2201	1.5180	0.1291	0.3038
NEGWTSF	7.1140	11.0518	0.6440	0.5198	-0.1466
KIDS05	-0.1497	0.6114	-0.2450	0.8066	0.0611
KIDS610	0.3285	0.5459	0.6020	0.5474	0.0501
KIDS17	-0.2454	0.5156	-0.4760	0.6341	0.0911
NADULTS	-0.7762	0.5383	-1.4420	0.1494	0.1499
DIV	0.0781	0.0848	0.9210	0.3571	0.5104
SEP	0.0482	0.0966	0.4980	0.6182	0.1958
NEVERMAR	-0.0114	0.1108	-0.1030	0.9179	0.1157
BLACK	0.0912	0.0941	0.9690	0.3324	0.2433
MIDWEST	-0.2702	0.5288	-0.5110	0.6093	0.2760
NOREAST	-0.1842	0.6787	-0.2710	0.7861	0.1306
SOUTH	-0.2338	0.7256	-0.3220	0.7473	0.4481
TENURE	-0.0126	0.0740	-0.1710	0.8646	0.4243
UNRATE	0.0347	0.1503	0.2310	0.8174	0.8145
DISABLED	0.1230	0.1243	0.9900	0.3224	0.1424
ED	1.4748	6.3615	0.2320	0.8167	0.1131
AGE	0.3961	0.4683	0.8460	0.3976	0.3709
GPRIMEA	0.1091	0.2349	0.4650	0.6422	0.1562
NEGWTSA	-0.8621	0.2984	-2.8890	0.0039	-0.5055

Table F3: Rural Model Marginal Effects for the Bivariate Probit Conditional Mean Function, Pr(APART|FPART=0)

Avg. Prob = 0.017093

Variable	Marg. Effect	S.E.	t-stat.	p-level	Mean of X
CONSTANT	0.0810	0.1544	0.5250	0.5996	
GPRIMEA	-0.0392	0.0846	-0.4640	0.6426	0.1562
UNEARN	-0.1491	0.1113	-1.3400	0.1801	0.3038
NEGWTSA	0.3100	0.2559	1.2120	0.2256	-0.5055
KIDS05	0.2771	0.2153	1.2870	0.1981	0.0611
KIDS610	0.0537	0.1139	0.4720	0.6369	0.0501
KIDS17	0.1796	0.1626	1.1050	0.2692	0.0911
NADULTS	0.2070	0.1454	1.4230	0.1547	0.1499
DIV	-0.0176	0.0255	-0.6900	0.4901	0.5104
SEP	0.0026	0.0241	0.1100	0.9126	0.1958
NEVERMAR	0.0309	0.0371	0.8340	0.4045	0.1157
BLACK	-0.0101	0.0209	-0.4840	0.6281	0.2433
MIDWEST	-0.0092	0.0518	-0.1780	0.8588	0.2760
NOREAST	-0.0449	0.0763	-0.5890	0.5558	0.1306
SOUTH	-0.0738	0.0916	-0.8060	0.4204	0.4481
TENURE	-0.0248	0.0276	-0.8970	0.3699	0.4243
UNRATE	0.0350	0.0433	0.8080	0.4189	0.8145
DISABLED	0.0248	0.0286	0.8650	0.3872	0.1424
ED	-0.2602	0.5953	-0.4370	0.6620	0.1131
AGE	-0.0774	0.0903	-0.8570	0.3915	0.3709
GPRIMEF	-0.0488	0.0781	-0.6250	0.5321	0.1724
NEGWTSF	-0.5906	0.9189	-0.6430	0.5204	-0.1466

Table F4: Rural Model Marginal Effects for the Bivariate Probit Conditional Mean Function, Pr(FPART|APART=0)

Avg. Prob = 0.3781

Variable	Marg. Effect	S.E.	t-stat.	p-level	Mean of X
CONSTANT	1.1212	1.7006	0.6590	0.5097	
GPRIMEF	0.8915	1.3132	0.6790	0.4972	0.1724
UNEARN	0.0388	0.3013	0.1290	0.8975	0.3038
NEGWTSF	10.7833	15.8446	0.6810	0.4961	-0.1466
KIDS05	0.7923	0.8048	0.9840	0.3249	0.0611
KIDS610	0.8099	0.6859	1.1810	0.2377	0.0501
KIDS17	0.2413	0.7089	0.3400	0.7335	0.0911
NADULTS	-0.6275	0.8074	-0.7770	0.4370	0.1499
DIV	0.0756	0.1110	0.6810	0.4959	0.5104
SEP	0.0986	0.1329	0.7420	0.4583	0.1958
NEVERMAR	0.0982	0.1416	0.6930	0.4881	0.1157
BLACK	0.1285	0.1061	1.2110	0.2260	0.2433
MIDWEST	-0.5315	0.7504	-0.7080	0.4788	0.2760
NOREAST	-0.5110	1.0017	-0.5100	0.6100	0.1306
SOUTH	-0.7132	1.0562	-0.6750	0.4995	0.4481
TENURE	-0.1186	0.0769	-1.5410	0.1233	0.4243
UNRATE	0.1984	0.2145	0.9250	0.3550	0.8145
DISABLED	0.3211	0.1073	2.9920	0.0028	0.1424
ED	1.7048	9.9235	0.1720	0.8636	0.1131
AGE	0.4290	0.6959	0.6160	0.5376	0.3709
GPRIMEA	0.0492	0.1001	0.4910	0.6235	0.1562
NEGWTSA	-0.3883	0.1311	-2.9620	0.0031	-0.5055

Table F5: Suburban Model Marginal Effects for the Bivariate Probit Conditional Mean Function, Pr(APART|FPART=1)

Avg. Prob = 0.289912

Variable	Marg. Effect	S.E.	t-stat.	p-level	Mean of X
Constant	-0.6228	0.6744	-0.9240	0.3557	
GPRIMEA	1.0231	0.4647	2.2010	0.0277	0.1745
UNEARN	-0.2925	0.3338	-0.8760	0.3809	0.4863
NEGWTSA	2.8386	0.7190	3.9480	0.0001	-0.5324
KIDS05	1.2847	1.1397	1.1270	0.2596	0.0487
KIDS610	-0.4039	0.9144	-0.4420	0.6587	0.0489
KIDS17	-0.0537	0.8432	-0.0640	0.9492	0.1002
NADULTS	1.9117	0.8851	2.1600	0.0308	0.1538
DIV	0.0378	0.1560	0.2420	0.8086	0.4894
SEP	0.1547	0.1504	1.0280	0.3039	0.2023
NEVERMAR	-0.0490	0.2072	-0.2360	0.8131	0.1426
BLACK	-0.0292	0.1510	-0.1930	0.8468	0.2139
ORACE	0.1963	1.0136	0.1940	0.8464	0.0385
MIDWEST	-0.1917	0.1597	-1.2000	0.2300	0.2408
NOREAST	-0.5132	0.2269	-2.2620	0.0237	0.2331
SOUTH	-0.2113	0.2481	-0.8520	0.3943	0.3121
TENURE	-0.1328	0.1329	-0.9990	0.3176	0.4971
UNRATE	-0.1315	0.4048	-0.3250	0.7454	0.7713
DISABLED	0.1379	0.1332	1.0360	0.3004	0.1175
ED	0.6769	3.4364	0.1970	0.8438	0.1179
AGE	0.0606	0.6324	0.0960	0.9237	0.3786
GPRIMEF	-0.7438	1.0870	-0.6840	0.4938	0.1458
NEGWTSF	-11.0263	4.5628	-2.4170	0.0157	-0.1485

Table F6: Suburban Model Marginal Effects for the Bivariate Probit Conditional Mean Function, Pr(FPART|APART=1

Avg. Prob = 0.826664

Variable	Marg. Effect	S.E.	t-stat.	p-level	Mean of X
Constant	1.1115	0.8039	1.3830	0.1667	
GPRIMEF	0.9686	1.2863	0.7530	0.4515	0.1458
UNEARN	0.0557	0.3617	0.1540	0.8777	0.4863
NEGWTSF	14.3580	7.4019	1.9400	0.0524	-0.1485
KIDS05	-0.2931	1.0237	-0.2860	0.7746	0.0487
KIDS610	0.7842	0.9602	0.8170	0.4141	0.0489
KIDS17	0.6385	0.9351	0.6830	0.4947	0.1002
NADULTS	-1.7413	0.8817	-1.9750	0.0483	0.1538
DIV	0.0565	0.1250	0.4520	0.6513	0.4894
SEP	0.0248	0.1182	0.2100	0.8337	0.2023
NEVERMAR	0.1803	0.1701	1.0600	0.2890	0.1426
BLACK	-0.0470	0.1153	-0.4080	0.6835	0.2139
ORACE	-0.2375	0.7618	-0.3120	0.7552	0.0385
MIDWEST	0.0059	0.1393	0.0420	0.9664	0.2408
NOREAST	0.1087	0.1851	0.5870	0.5570	0.2331
SOUTH	-0.1861	0.2699	-0.6890	0.4906	0.3121
TENURE	-0.0872	0.1221	-0.7140	0.4753	0.4971
UNRATE	0.0254	0.2981	0.0850	0.9321	0.7713
DISABLED	0.0856	0.1250	0.6850	0.4931	0.1175
ED	2.6381	3.8865	0.6790	0.4973	0.1179
AGE	-0.0841	0.4935	-0.1700	0.8647	0.3786
GPRIMEA	-0.6275	0.3641	-1.7230	0.0849	0.1745
NEGWTSA	-1.7410	0.5894	-2.9540	0.0031	-0.5324

Table F7: Suburban Model Marginal Effects for the Bivariate Probit Conditional Mean Function, Pr(APART|FPART=0)

Avg. Prob = 0.989907

Variable	Marg. Effect	S.E.	t-stat.	p-level	Mean of X
Constant	-0.0374	0.0510	-0.7320	0.4641	
GPRIMEA	0.0798	0.0735	1.0860	0.2774	0.1745
UNEARN	-0.0247	0.0216	-1.1430	0.2531	0.4863
NEGWTSA	0.2214	0.1634	1.3550	0.1753	-0.5324
KIDS05	0.1078	0.1052	1.0250	0.3054	0.0487
KIDS610	-0.0232	0.0708	-0.3280	0.7426	0.0489
KIDS17	0.0051	0.0617	0.0830	0.9336	0.1002
NADULTS	0.1404	0.0914	1.5360	0.1246	0.1538
DIV	0.0042	0.0134	0.3110	0.7557	0.4894
SEP	0.0139	0.0176	0.7890	0.4302	0.2023
NEVERMAR	-0.0015	0.0162	-0.0930	0.9260	0.1426
BLACK	-0.0033	0.0118	-0.2790	0.7806	0.2139
ORACE	0.0135	0.0792	0.1710	0.8644	0.0385
MIDWEST	-0.0167	0.0167	-0.9990	0.3180	0.2408
NOREAST	-0.0432	0.0338	-1.2770	0.2016	0.2331
SOUTH	-0.0214	0.0255	-0.8370	0.4028	0.3121
TENURE	-0.0130	0.0151	-0.8570	0.3916	0.4971
UNRATE	-0.0111	0.0327	-0.3400	0.7338	0.7713
DISABLED	0.0134	0.0154	0.8660	0.3863	0.1175
ED	0.0998	0.2683	0.3720	0.7098	0.1179
AGE	0.0040	0.0485	0.0830	0.9342	0.3786
GPRIMEF	-0.0501	0.0679	-0.7380	0.4603	0.1458
NEGWTSF	-0.7432	0.4938	-1.5050	0.1323	-0.1485

Table F8: Suburban Model Marginal Effects for the Bivariate Probit Conditional Mean Function, Pr(FPART|APART=0)

Avg. Prob = 0.893578

Variable	Marg. Effect	S.E.	t-stat.	p-level	Mean of X
Constant	0.6699	0.2425	2.7620	0.0057	
GPRIMEF	0.5092	0.7763	0.6560	0.5119	0.1458
UNEARN	-0.0633	0.1601	-0.3950	0.6927	0.4863
NEGWTSF	7.5485	2.0896	3.6120	0.0003	-0.1485
KIDS05	0.2386	0.4506	0.5300	0.5965	0.0487
KIDS610	0.4858	0.3272	1.4850	0.1376	0.0489
KIDS17	0.4975	0.3432	1.4500	0.1472	0.1002
NADULTS	-0.7026	0.5100	-1.3780	0.1683	0.1538
DIV	0.0598	0.0695	0.8600	0.3898	0.4894
SEP	0.0774	0.0672	1.1530	0.2491	0.2023
NEVERMAR	0.1280	0.0838	1.5280	0.1266	0.1426
BLACK	-0.0489	0.0466	-1.0500	0.2939	0.2139
ORACE	-0.1197	0.2379	-0.5030	0.6148	0.0385
MIDWEST	-0.0663	0.0616	-1.0770	0.2817	0.2408
NOREAST	-0.1021	0.0830	-1.2300	0.2186	0.2331
SOUTH	-0.2291	0.0975	-2.3500	0.0188	0.3121
TENURE	-0.1198	0.0471	-2.5430	0.0110	0.4971
UNRATE	-0.0281	0.1153	-0.2440	0.8073	0.7713
DISABLED	0.1205	0.0539	2.2370	0.0253	0.1175
ED	2.3885	1.6659	1.4340	0.1516	0.1179
AGE	-0.0457	0.2213	-0.2060	0.8365	0.3786
GPRIMEA	-0.1293	0.0564	-2.2950	0.0217	0.1745
NEGWTSA	-0.3589	0.1145	-3.1340	0.0017	-0.5324

Table F9: Urban Model Marginal Effects for the Bivariate Probit Conditional Mean Function, Pr(APART|FPART=1)

Avg. Prob = 0.489601

Variable	Marg. Effect	S.E.	t-stat.	p-level	Mean of X
Constant	-0.5414	0.3953	-1.3700	0.1708	
GPRIMEA	1.1489	0.3846	2.9870	0.0028	0.2397
UNEARN	-0.6505	0.2963	-2.1950	0.0281	0.2585
NEGWTSA	2.7514	0.4547	6.0510	0.0000	-0.4724
KIDS05	0.9188	0.5796	1.5850	0.1129	0.0651
KIDS610	0.7410	0.6915	1.0720	0.2839	0.0534
KIDS17	0.2137	0.5247	0.4070	0.6837	0.0921
NADULTS	1.3348	0.5601	2.3830	0.0172	0.1550
DIV	0.2175	0.1603	1.3570	0.1749	0.3354
SEP	0.1108	0.1597	0.6940	0.4878	0.2469
NEVERMAR	0.1574	0.1561	1.0080	0.3134	0.2717
BLACK	0.1993	0.0970	2.0550	0.0399	0.4891
ORACE	-0.6137	0.5495	-1.1170	0.2641	0.0155
MIDWEST	0.0313	0.1537	0.2040	0.8387	0.2717
NOREAST	-0.3401	0.1538	-2.2110	0.0270	0.2158
SOUTH	-0.0968	0.1700	-0.5700	0.5688	0.3494
TENURE	-0.1771	0.0991	-1.7880	0.0738	0.2717
UNRATE	0.2204	0.2680	0.8220	0.4110	0.7450
DISABLED	0.1061	0.1214	0.8740	0.3822	0.1398
ED	4.2537	2.2803	1.8650	0.0621	0.1130
AGE	0.2401	0.5122	0.4690	0.6393	0.3659
GPRIMEF	-0.7964	0.6206	-1.2830	0.1994	0.1902
NEGWTSF	-2.8646	1.7157	-1.6700	0.0950	-0.1408

Table F10: Urban Model Marginal Effects for the Bivariate Probit Conditional Mean Function, Pr(FPART|APART=1)

Avg. Prob = 0.884074

Variable	Marg. Effect	S.E.	t-stat.	p-level	Mean of X
Constant	0.1987	0.1943	1.0230	0.3065	
GPRIMEF	0.8065	0.6267	1.2870	0.1981	0.1902
UNEARN	0.1539	0.1478	1.0410	0.2979	0.2585
NEGWTSF	2.9010	1.7467	1.6610	0.0967	-0.1408
KIDS05	0.3700	0.4493	0.8240	0.4102	0.0651
KIDS610	0.1473	0.4213	0.3500	0.7267	0.0534
KIDS17	0.0680	0.3575	0.1900	0.8491	0.0921
NADULTS	-0.7566	0.3857	-1.9610	0.0498	0.1550
DIV	-0.0670	0.0802	-0.8350	0.4035	0.3354
SEP	-0.0242	0.0823	-0.2940	0.7685	0.2469
NEVERMAR	0.0282	0.0808	0.3490	0.7267	0.2717
BLACK	-0.0067	0.0548	-0.1220	0.9033	0.4891
ORACE	0.0373	0.2515	0.1480	0.8820	0.0155
MIDWEST	0.0744	0.0767	0.9700	0.3319	0.2717
NOREAST	0.2387	0.0868	2.7500	0.0060	0.2158
SOUTH	0.0006	0.0836	0.0070	0.9944	0.3494
TENURE	-0.0381	0.0493	-0.7730	0.4395	0.2717
UNRATE	0.1136	0.1669	0.6810	0.4959	0.7450
DISABLED	0.0416	0.0606	0.6870	0.4920	0.1398
ED	-2.0007	1.5126	-1.3230	0.1860	0.1130
AGE	-0.2485	0.2872	-0.8650	0.3870	0.3659
GPRIMEA	-0.4168	0.1477	-2.8210	0.0048	0.2397
NEGWTSA	-0.9982	0.2105	-4.7410	0.0000	-0.4724

Table F11: Urban Model Marginal Effects for the Bivariate Probit Conditional Mean Function: Pr(APART|FPART=0)

Avg. Prob = 0.950563

Variable	Marg. Effect	S.E.	t-stat.	p-level	Mean of X
Constant	-0.1495	0.1158	-1.2910	0.1968	
GPRIMEA	0.3171	0.1316	2.4100	0.0159	0.2397
UNEARN	-0.1752	0.0843	-2.0790	0.0376	0.2585
NEGWTSA	0.7593	0.2125	3.5730	0.0004	-0.4724
KIDS05	0.2162	0.1675	1.2910	0.1967	0.0651
KIDS610	0.1824	0.1970	0.9260	0.3545	0.0534
KIDS17	0.0513	0.1521	0.3370	0.7361	0.0921
NADULTS	0.3828	0.1606	2.3850	0.0171	0.1550
DIV	0.0594	0.0462	1.2840	0.1990	0.3354
SEP	0.0297	0.0453	0.6560	0.5118	0.2469
NEVERMAR	0.0389	0.0453	0.8590	0.3901	0.2717
BLACK	0.0515	0.0286	1.8040	0.0713	0.4891
ORACE	-0.1595	0.1556	-1.0250	0.3052	0.0155
MIDWEST	0.0041	0.0430	0.0950	0.9243	0.2717
NOREAST	-0.1000	0.0495	-2.0200	0.0434	0.2158
SOUTH	-0.0249	0.0482	-0.5160	0.6057	0.3494
TENURE	-0.0434	0.0295	-1.4730	0.1407	0.2717
UNRATE	0.0505	0.0805	0.6280	0.5302	0.7450
DISABLED	0.0250	0.0344	0.7280	0.4669	0.1398
ED	1.1982	0.7364	1.6270	0.1037	0.1130
AGE	0.0748	0.1449	0.5160	0.6056	0.3659
GPRIMEF	-0.2473	0.1920	-1.2880	0.1979	0.1902
NEGWTSF	-0.8895	0.5475	-1.6250	0.1042	-0.1408

Table F12: Urban Model Marginal Effects for the Bivariate Probit Conditional Mean Function: Pr(FPART)|APART=0

Avg. Prob = 0.707477

Variable	Marg. Effect	S.E.	t-stat.	p-level	Mean of X
Constant	0.1911	0.2531	0.7550	0.4502	
GPRIMEF	1.1991	0.9315	1.2870	0.1980	0.1902
UNEARN	0.0781	0.1877	0.4160	0.6776	0.2585
NEGWTSF	4.3132	2.5388	1.6990	0.0893	-0.1408
KIDS05	0.9384	0.6123	1.5330	0.1254	0.0651
KIDS610	0.4869	0.5769	0.8440	0.3987	0.0534
KIDS17	0.1861	0.5074	0.3670	0.7139	0.0921
NADULTS	-0.9472	0.5685	-1.6660	0.0957	0.1550
DIV	-0.0539	0.1045	-0.5150	0.6064	0.3354
SEP	-0.0098	0.1077	-0.0910	0.9278	0.2469
NEVERMAR	0.0980	0.1081	0.9070	0.3646	0.2717
BLACK	0.0484	0.0750	0.6450	0.5191	0.4891
ORACE	-0.1188	0.3124	-0.3800	0.7036	0.0155
MIDWEST	0.1423	0.0957	1.4880	0.1369	0.2717
NOREAST	0.3233	0.0974	3.3180	0.0009	0.2158
SOUTH	-0.0282	0.1079	-0.2620	0.7937	0.3494
TENURE	-0.1216	0.0646	-1.8820	0.0598	0.2717
UNRATE	0.2695	0.2413	1.1170	0.2641	0.7450
DISABLED	0.1064	0.0797	1.3340	0.1822	0.1398
ED	-2.2859	2.0230	-1.1300	0.2585	0.1130
AGE	-0.3710	0.3752	-0.9890	0.3227	0.3659
GPRIMEA	-0.3968	0.1489	-2.6660	0.0077	0.2397
NEGWTSA	-0.9503	0.1567	-6.0660	0.0000	-0.4724

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