

**UNDERSTANDING FOOD STAMP PROGRAM PARTICIPATION AMONG
FEMALE-HEADED HOUSEHOLDS: HAS IT BEEN AFFECTED BY
PARTICIPATION IN THE AFDC/TANF PROGRAM?**

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(ABSTRACT)

The caseloads of food stamp program and welfare program experienced sharp drops among non-metropolitan single female-headed families with children (SFHFwC) after welfare reform in 1996. There is concern that leaving welfare program has led to nonparticipation in food stamp program due to multiple reasons.

This study conducts an empirical analysis of non-metropolitan SFHFwC's participation in food stamp program and welfare program, using the 1993 and 1999 CPS data. Results from using reduced-form probit model, bivariate probit model and structural probit model are compared. The reduced-form probit model considers participation in both programs as functions of all exogenous variables. The bivariate probit model allows correlation between the participation in the two programs. The structural probit model considers participation in welfare as an endogenous variable of FSP participation. Empirical analysis is also conducted through the comparison across years and between southern and the remaining U.S. states.

We found that welfare participation has a significant and positive impact on FSP participation. Households leaving welfare are more likely not to participate in FSP. Further, welfare participation is more important in determining FSP participation in 1999 than in 1993. Residence in South has a significant and negative impact in welfare participation in 1999, but has no significant impact on FSP participation in either year. Incomes and number of young children are the other major determinants of participation in both programs. Policy suggestions include improving economic situation to reduce FSP caseloads on one side, and providing more information about FSP eligibility to welfare leavers to ensure their food safety on the other side.

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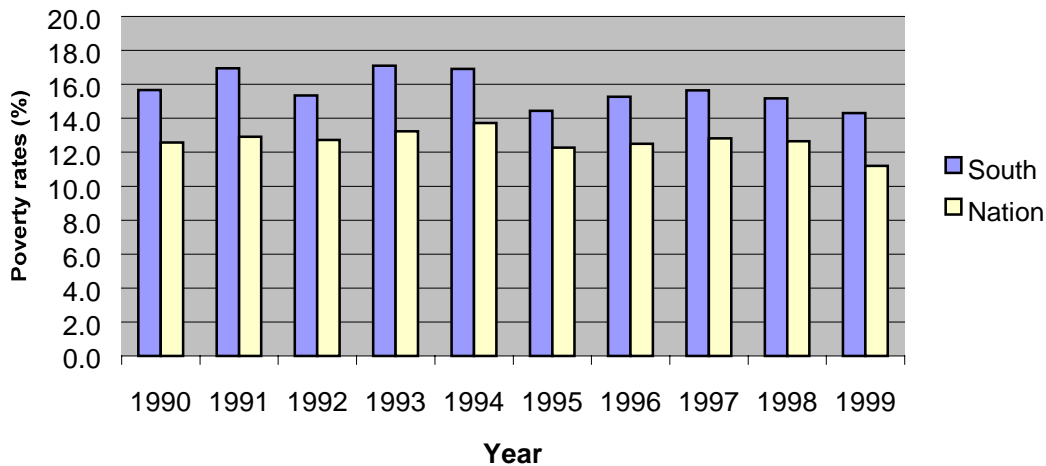
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Chapter 1: Introduction

1.1 Problem Statement

1.1.1 Background

Despite the strong economic growth over the past two decades, the poverty rate of families in non-metropolitan southern states¹ (South hereafter) remains high (Mills, 1998). Poverty rates for non-metro South families were more than two percent higher than those for families of the whole country in the 1990s (see figure 1.1)². Of these poor families in the non-metro South, single female-headed families with children (SFHFwC) account for a significant part. Although only 9.6 percent of non-metro South families were SFHFwC in 1999, the poverty rates of these families were as high as 47.6 percent even after substantial decline since the mid 1990s. Poverty rates for the other years in the 1990s were even higher (see figure 1.2).

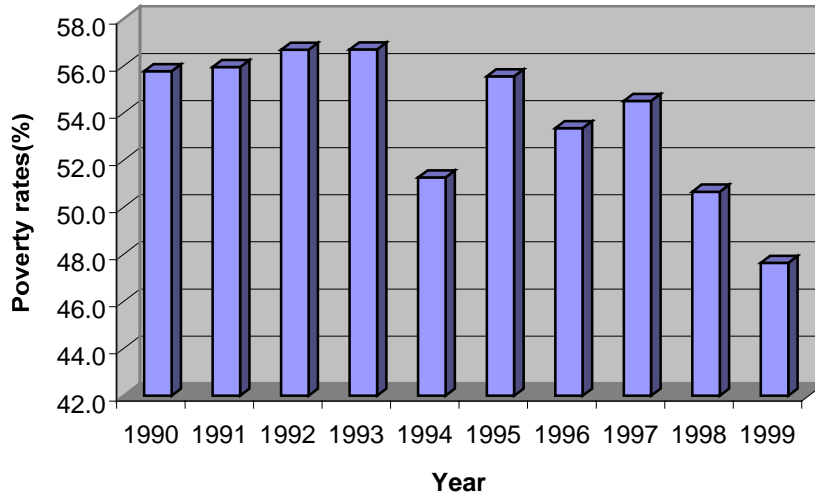


¹ Including Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, and Louisiana.

² All the data come from Current Population Survey, March file unless otherwise specified. Because of the lag of the surveys, data cited or computed from a certain year actually reflect the situation in the previous year. The non-metro South SFHFwC referred to here are those whose heads' ages are between 18 and 65 unless otherwise specified.

Source: CPS 1990 through 1999

Figure 1.1 Poverty rates of non-metro families in 1990s



Source: CPS 1990 through 1999

Figure 1.2 Poverty rates of nonmetro South SFHFwC in 1990s

It is argued that, due to multiple constraints, SFHFwC are more vulnerable to poverty than two-parent or male-headed families (Blank and Ruggles, 1993). SFHFwC heads tend not to work, to have low educational levels and to have a heavy time burden for child rearing. In 1999, the full-time employment rate of SFHFwC heads between ages of 18 and 65 was 60.4 percent, compared to 66.5 percent for non-SFHFwC heads. Twenty-five percent of SFHFwC heads had an educational attainment less than high school, compared to 21.4 percent for non-SFHFwC heads (Table 1.1). The burden of children over SFHFwC heads is evident; they spend time taking care of their children and make choices between working and staying home. SFHFwC suffer more from unemployment, low income, low living standards, and even insufficient access to foods (Blank and Ruggles, 1993).

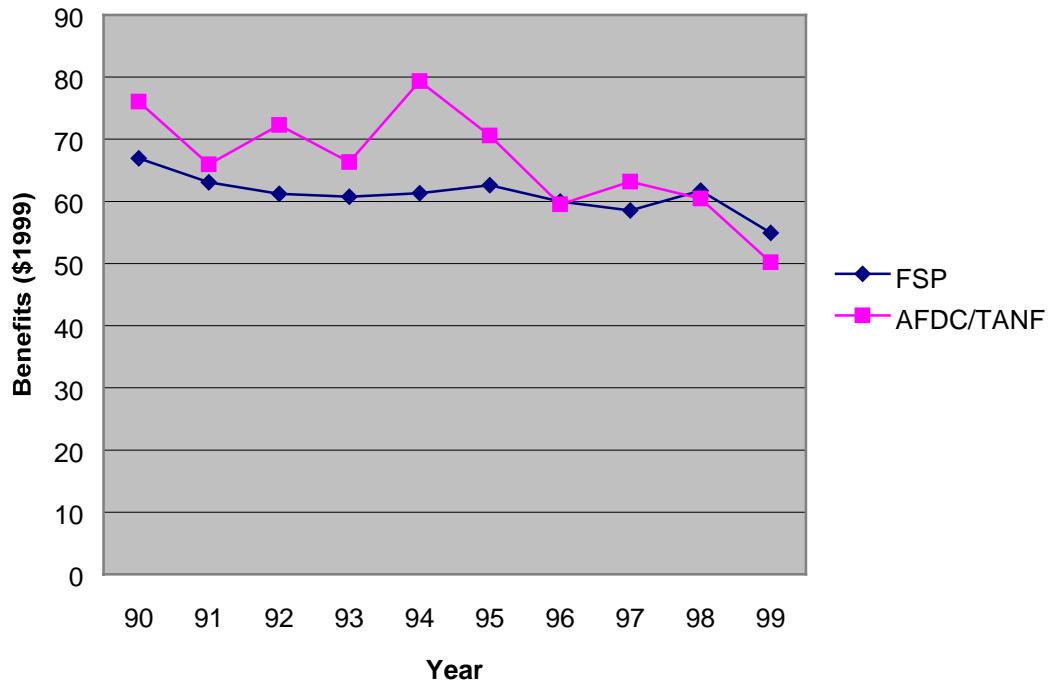
Table 1.1 1999 Educational level and work status of SFHFwC vs. non-SFHFwC heads

	SFHFwC	Non-SFHFwC
Educational level (%):		
Less than high school	25.0	21.1
High school	38.7	41.2
Some college	22.6	21.4
College or higher	13.7	16.3
Work status (%):		
Not in labor force	24.1	23.4
Full-time employed	60.4	66.5
Part-time employed	9.9	7.3
Unemployed	5.7	2.9

Source: CPS 1999

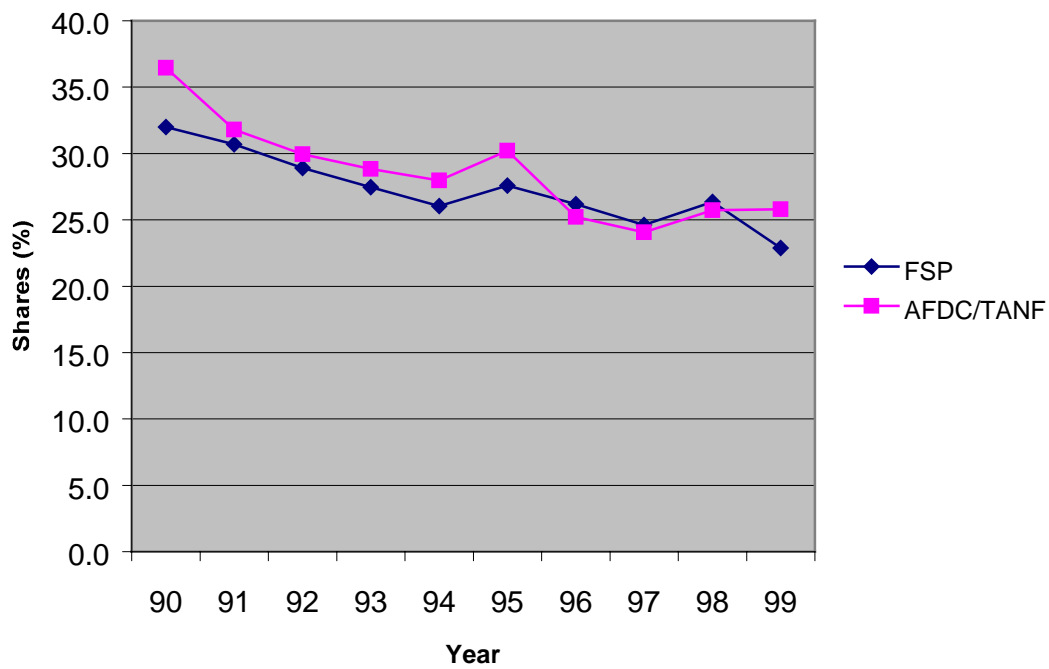
1.1.2 FSP and AFDC/TANF

Two major federal programs providing assistance to low-income families have been the Food Stamp Program (FSP) and Aid to Families with Dependent Children (AFDC). Created under the Food Stamp Act of 1964 and amended in 1977, FSP is aimed to “end hunger and improve nutrition and health” and to “help low-income households buy the food they need for a nutritionally adequate diet” (FNS Office, 2000). It has been the largest federal non-categorical assistance program in the United States over the last three decades. In fiscal year 1997, the total disbursement for FSP was nearly \$20 billion; about 23 million people from 9 million families benefited from FSP each month. Participation rates for FSP are high. Seventy-one percent of eligible people participated in the program in January 1994 (Gunderson et al., 1999). In March 1994, the number of FSP participants peaked at 28 million. As of March 1997, about 45.9 percent of total SFHFwC in the non-metro South participated in FSP. For the participating family, each family member received, on average, \$55.73 (in 1999 dollars) in benefits monthly. Figure 1.3 and 1.4 indicate average monthly FSP and AFDC/TANF benefits per family member and the shares of per capita FSP benefits in total per capita total family receipts for those FSP benefit-receiving families during the past decades.



Source: CPS 1990 through 1999

Figure 1.3 Monthly FSP and AFDC/TANF benefits per family member for non-metro South SFHFwC participants



Source: CPS 1990 through 1999

Figure 1.4 Shares of per capita FSP and AFDC/TANF benefits in per capita total family receipts in non-metro South SFHFwC receiving those benefits

While the FSP provides non-cash food assistance to eligible poor families, the Aid to Families with Dependent Children (AFDC) provides cash assistance. Before the end of 1996, AFDC was a federal entitlement program, benefiting approximately 14 million recipients from about 5 million families during an average month in 1994. The average monthly welfare payment per recipient was \$149.90 (in 1999 dollars) in 1994 (Administration for Children and Families, 2000). About 25 percent of non-metro South SFHFwC received AFDC benefits in 1994. For those families on the AFDC program, the average monthly benefit was \$76.44 per family member (in 1999 dollar) as of March 1994. Figures 1.3 and 1.4 also indicate the average monthly AFDC/TANF³ benefits (in 1999 dollars) per family member and the share of per capita AFDC/TANF benefits in per capita total family receipts for those AFDC/TANF benefit-receiving families during the past decade.

Participation in FSP and AFDC are highly interrelated because both programs are targeted to help low-income people. Some conditions, such as low income and number of dependent children, qualifying a family for one program also qualify it for the other. It is believed that families on AFDC/TANF are also very likely to participate in FSP. Unlike AFDC/TANF, “FSP has few categorical requirements for eligibility, such as the presence of children, elderly, or disabled individuals in a household” (Stavrianos and Nixon, 1998). As a result, for example, 38 and 43 percent of FSP participants received AFDC benefits in 1990 and 1993, respectively (Gunderson, et al., 1999); while in 1997, 85 percent of TANF participants received FSP assistance. In the non-metro South, 51.2 percent of SFHFwC on FSP received AFDC benefits. In contrast, 93.3 percent of SFHFwC on AFDC received FSP assistance in 1994. Thus, AFDC/TANF recipients are very likely to also receive food stamps.

1.1.3 Welfare reform

³ As will be discussed in the subsequent section, the Temporary Assistance to Needy Families (TANF) replaced AFDC in 1996.

AFDC and FSP constitute two most important public assistance programs in the United States, playing a primary role in supporting low-income people and families. However, there have long been concerns about these two programs. The first concern is about the ‘explosive’ increase in welfare caseloads over the last decade through the early 1990s. The second, in companion with the first one, is related to the tremendously expanded federal expenditures on both programs. The third, as perceived by many researchers for a long time, is related to the work disincentives associated with income assistance programs (Moffitt et al., 1992). AFDC, as well as other welfare programs, has been claimed to be responsible for creating dependency of poor individuals or families on the welfare system.

In August 1996, President Clinton signed into law "The Personal Responsibility and Work Opportunity Reconciliation Act of 1996" (PRWORA). The law was put into effect on January 1, 1997. The primary goal of the law is to move welfare dependents that are able to work into employment. The major contents of the law are the replacement of AFDC by the Temporary Assistance for Needy Families (TANF) and the change of federal entitlement assistance to block grant to states. Under TANF, states have authority to determine their own eligibility and benefit levels under the guideline of federal law. The following highlights two major aspects of TANF rules:

1. Work requirement. “With few exceptions, able-bodied recipients must work after two years on assistance. Twenty-five percent of all families in each state must be engaged in work activities or have left the rolls in fiscal year (FY) 1997, rising to 50 percent in FY 2002. Single parents must participate for at least 20 hours per week the first year, increasing to at least 30 hours per week by FY 2000” (Administration of Children and Families, web page, 2000).

2. A five-year time limit. In general, “families who have received assistance for five cumulative years (or less at state option) will be ineligible for cash aid under the new welfare law. States will be permitted to exempt up to 20 percent of their caseload from the time” (Administration of Children and Families, 2000). States also have the power to set more restrictive time limits and, in fact, many states have set limits of less than 5 years (See Appendix 2).

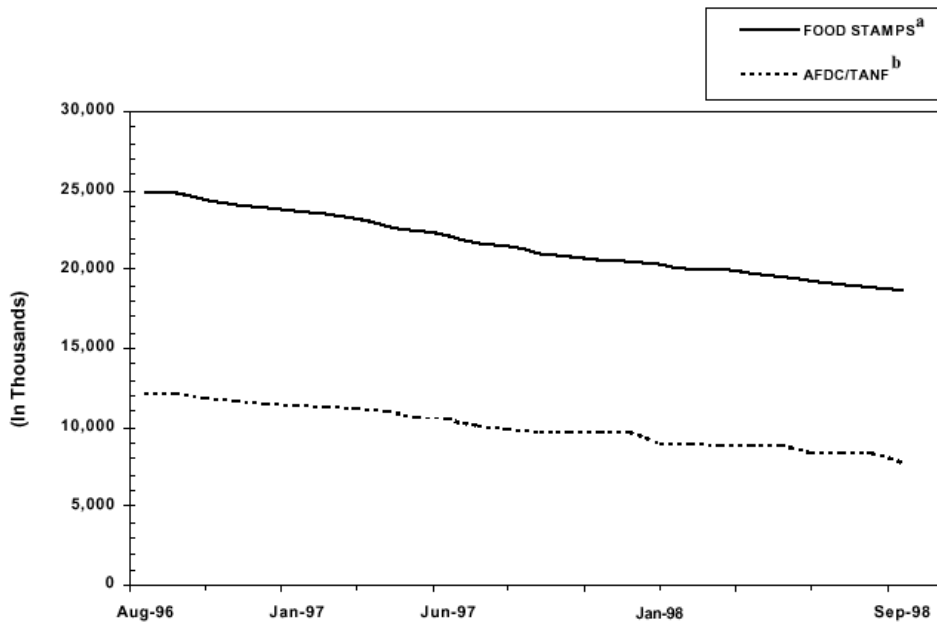
The PRWORA also has some provisions pertaining to FSP with respect to time limits and work requirements:

“Non-exempt individuals would be ineligible to continue to receive food stamps if they receive food stamps for 3 months in a preceding 36-month period while they did not work at least 20 hours per week (averaged monthly), participate in a workfare or approved E&T program (Employment and Training), or did not participate in a work program for at least 20 hours a week” (Food and Nutrition Service Office, web page, 2000).

The work requirement and lifetime time limit are at the heart of PRWORA. Since TANF has become temporary and a block grant program operated by states, FSP is becoming more and more important as the only federal entitlement assistance program ensuring adequate food and nutrition to poor or needy families.

1.1.4 Post-reform caseload changes

After an upsurge in caseloads in the first few years of the 1990s, TANF caseloads and FSP participation declined dramatically during the mid- and late- 1990s. Both programs experienced the largest decline in their history. Participation in FSP fell by 9 million, or 33 percent, from its peak in March 1994 through the end of fiscal year 1998. During this same period, the number of people participating in AFDC/TANF dropped by over 5 million, or 36 percent (Castner and Cody, 1999). Figure 1.5 shows the participation trends for the two programs over the last couple of years.



Source: The Urban Institute.

^aData from U.S. Department of Agriculture, Food and Consumer Service, Program Information Division, March 1999.

^bData from U.S. Department of Health and Human Services, Administration for Children and Families.

Source: Sheila R. Zedlewski and Sarah Brauner, Declines in Food Stamp and Welfare Participation: Is there a Connection? The Urban Institute, October 1999.

Figure 1.5 Trends of food stamp and welfare caseloads: 1996-1998 (in thousand persons)

For the non-metro South SFHFwC, participation in FSP and AFDC/TANF also dropped sharply after the implementation of PRWORA. As of March 1994, about 46 percent of SFHFwC received FSP benefits. This number fell to 31 percent as of March 1999. Approximately 25 percent of the non-metro South SFHFwC was on AFDC as of March 1994, falling to slightly less than 10 percent as of March 1999 (CPS, author's calculation).

1.1.5 Reasons for the decline in FSP participation

A number of factors account for the recent decline in participation in FSP and TANF. One explanation may be the new regulation of eligibility. PRWORA moved most legal aliens out of FSP. This caused the number of participants of FSP who were legal permanent residents to decrease from 1,537,000 in the summer 1994 to 706,000 in the summer 1997, accounting for 14% of the total participation drop during the same period (Genser, 1999).

Under the work requirement of the PRWORA, able-bodied adults without dependent children are limited to receiving food stamps for only 3 months unless they participate in a workfare or approved E&T program, or participate in a work program for at least 20 hours a week. According to Genser, this restriction caused number of participants of this group to drop from 1,148,000 in the summer 1994 to 648,000 in summer 1997, representing 8 percent of the total drop during the period.

Strong economic growth over the last couple of years is also an important reason for the participation decline. The GDP growth rates for 1997, 1998 and 1999 were 4.5, 4.3 and 4.1 percent respectively (US Department of Commerce). Economic prosperity created many job opportunities for low-income individuals. Improved human capital among female heads may also contribute to increased employment rates. Their higher earnings may make them ineligible for or cause them to feel no need for participating in FSP or TANF. Especially given lifetime limits, former participants who have recently entered the job market might leave TANF in order to “bank” their benefits for future need. This can be demonstrated by the declining unemployment rates (or increasing employment rates) and improved earnings (with earnings declined in 1997) among the non-metro South SFHFwC heads. Table 1.2 shows these two trends along with the human capital condition changes (with proportion of less than high school degree increased in 1999).

Table 1.2 Less than high school degree, full-time employment rates and per capita earnings of non-metro South SFHFwC

	1996	1997	1998	1999
Less than high School degree (%)	29.2	27.5	22.5	25
Full-time Employment (%)	49.1	52.5	55.9	60.4
Yearly earnings (1999 dollars)	4051.64	3725.95	4345.80	5189.68

Source: CPS 1996 through 1999

The contribution of each of these factors to the decline in FSP participation among non-metro South SFHFwC is unclear. These factors (welfare reform, economic expansion and other factors) combined certainly affected participation.

1.1.6 Problem statement

The above sections describe the decline in caseloads for FSP and AFDC/TANF since the welfare reform in 1996 and some underlying reasons for the decline in FSP participation. However, it is unknown how participation decisions have changed over time and the degree to which economic growth and program reform have contributed to the decline. Castner and Cody observed the decline in FSP participation rate along with the decrease in welfare caseloads. The FSP participation rate (the ratio of the number of participants to the number of eligibles) decreased from 68.1 percent in 1996 to 63 percent in 1997, representing a drop of 5.1 percentage points (Castner and Cody, 1999). This means that FSP is now reaching fewer eligibles than it was prior to welfare reform. It is unknown how reduced TANF participation has, in turn, reduced participation in the FSP by FSP-eligible households.

Recent research has found that the indirect effect of leaving TANF is an important reason for the decline in FSP participation. In many cases, when a former AFDC/TANF recipient is disqualified for it due to new eligibility regulations, she/he is likely to deem herself/himself also ineligible for FSP. A letter from the Administrator of Food and Nutrition Service to the commissioners of all State welfare agencies may give some hints about this relationship:

“...Because of the seriousness of this matter, I encourage you to review your procedures and to make sure that individuals denied, diverted from, or terminated from TANF are fully considered for food stamps and receive benefits if they are entitled.” (FNS web page, January 29, 1999).

Genser's analysis shows that from the summer 1994 to the summer 1997, the drop in the number of FSP participants who were originally on AFDC/TANF accounted for 61 percent of the total drop during the same period. At least some families leaving AFDC/TANF are still eligible for FSP (Genser, 1999). If this is the case, it means that the caseloads of FSP have dropped too fast during the last years.

The consequence of the over-dramatic drop in FSP participation may be dire. Although many welfare recipients have moved into the workforce, their earnings often cannot lift them out of the poverty pool and make them 'self-sufficient', an objective of

welfare reform. Because these working poor no longer receive cash assistance, the role of FSP assistance in providing income and food support becomes more significant. Since FSP is the only remaining federal program that ensures food and nutrition security to low-income families, leaving the program when they are still in need of this assistance can cause them loss of well-being.

1. 2. Objectives

The goal of this thesis is to understand the pattern of the post-welfare reform FSP participation and find empirical evidence whether the post-welfare reform FSP participation of non-metro South SFHFwC is affected by participation in TANF, and, if yes, to what extent it is. The specific objectives are:

- a. Identify basic trends in FSP and TANF participation among non-metro South SFHFwC and document multiple sources of income of SFHFwC, and how these have changed
- b. Understand how changes in programs and program eligibility affect participation
- c. Understand the determinants of participation in FSP and examine whether and how it has been affected by participation in TANF.

1.3 Organization of the thesis

The following chapter presents a description of the CPS data and descriptive statistics related to non-metro South SFHFwC. Chapter three elucidates a theoretical model for participation in FSP and welfare program. Chapter four presents the empirical method. Chapter five presents the empirical results and chapter six presents the conclusions and some policy implications.

Chapter 2: Data and summary statistics

2.1 Chapter overview

This chapter presents summary statistics about non-metro SFHFwC in the southern U.S.. The focus is on the poor and near poor and those eligible for FSP. Section one introduces the CPS data used in this study. Section two introduces the study area and cohort of interest. Section three provides a comparison of basic household characteristics and their changes between 1993 and 1999. Section four presents income trends and income composition for SFHFwC through the 1990s. Section five describes changes in eligibility for FSP and the welfare program after the welfare reform.

2.2 Data source

The data used in this study come from the Current Population Survey (CPS) Series: Annual Demographic File. The survey is conducted jointly by the Bureau of Labor Statistics and the Bureau of the Census every year. It provides the primary source of information about employment, incomes and other demographic characteristics for about 50,000 households. It has detailed information about families/households' income components, including FSP and AFDC/TANF receipts. One major disadvantage of the CPS data is that they do not contain historical information, and can only be used for static analysis. Also they lack information about some subjective factors that might affect the SFHFwC's program participation. The empirical modeling in this study is based on 1993 and 1999 CPS data.

2.3 Study area and cohort

This study focuses on the non-metropolitan areas of the twelve states in the southern United States. The states include Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, and Louisiana, constituting the South in convention. As indicated before, Southern families have had a higher poverty rate than the nation as a whole. The poverty rate of southern non-metropolitan households is even higher.

Our primarily focus group is single-female-headed families with children (SFHFwC) in the non-metropolitan South, with the ages of the female heads between 18 and 65. The reason for this concern is that SFHFwC are among the most vulnerable groups who suffer from poverty and are also most likely to participate in AFDC/TANF. They are more dependent on TANF and FSP. Therefore, careful examination of their participation in FSP and TANF after welfare reform and of the programs' effects on each other is worth examining.

2.4 Basic cohort characteristics

There are 212 observations of SFHFwC in the non-metropolitan South for the 1999 CPS data and 351 observations for the 1993 CPS data, of which 259 and 138 families have income below 150 percent of federal poverty line. Basic demographic characteristics of different groups of interest for the two years are shown in tables 2.1 and tables 2.2.

Table 2.1 Basic demographic characteristics of heads of non-metro south SFHFwC with income under 150% poverty line⁴ in 1993 and 1999

	1993 (N=259)		1999 (N=138)		Mean difference	t-ratio	P-value
	Mean	Std. Dev.	Mean	Std. Dev.			
Age	33.6	7.8887	34.6	8.2089	-1.0	-1.14	0.2561
Race (%):							
White	46.7	0.4999	60.9	0.4898	-14.2	-2.7	0.0071
Black	52.1	0.5005	39.1	0.4898	13.0	2.48	0.0135
Native American	1.2	0.1072	0	0	1.2	1.27	0.2054
Edu. Attainment (%):							
Less than high school	34.4	0.4758	33.3	0.4731	1.0	0.21	0.8371
High school	56.8	0.4964	58.0	0.4954	-1.2	-0.23	0.8164
Some college	6.6	0.2481	7.3	0.2602	-0.7	-0.26	0.7976
College or above	2.3	0.1507	1.5	0.1199	0.9	0.58	0.5593
No. of children under 18	2.0	1.0815	1.8	1.0054	0.1	1.16	0.2487
Age 6-17	1.4	1.0994	1.4	1.0955	0.0	0.15	0.8832
Under age 6	0.6	0.7452	0.5	0.7464	0.1	1.42	0.1566
Work status (%):							
Not in labor force	39.8	0.4904	31.2	0.4648	8.6	1.7	0.0907
Full-time employed	36.3	0.4818	47.8	0.5013	-11.5	-2.24	0.0257
Part-time employed	15.4	0.3621	12.3	0.3299	3.1	0.84	0.399
Unemployed	8.5	0.2793	8.7	0.2828	-0.2	-0.07	0.9457

Note: Assuming equal variances for t-test of mean differences

Source: CPS 1993, 1999

⁴ This will be used as rough criteria for FSP and welfare eligibility hereafter. The rough approximation of eligibility should be noted throughout this study.

Table 2.2 Basic demographic characteristics of heads of non-metro non-south SFHFwC with income under 150% poverty line in 1993 and 1999

	1993 (N=433)		1999 (N=333)		Mean difference	t-ratio	P-value
	Mean	Std. Dev.	Mean	Std. Dev.			
Age	32.6	7.8869	32.9	8.1703	-0.3	-0.46	0.6437
Race (%):							
White	83.1	0.3748	89.2	0.311	-6.0	-2.38	0.0175
Black	5.3	0.2245	1.5	0.1218	3.8	2.8	0.0053
Native American	9.2	0.2899	8.1	0.2734	1.1	0.55	0.5838
Edu. Attainment (%):							
Less than high school	27.0	0.4446	17.1	0.3772	9.9	3.26	0.0012
High school	64.0	0.4806	70.3	0.4578	-6.3	-1.84	0.0669
Some college	6.2	0.2421	7.2	0.259	-1.0	-0.53	0.5934
College or above	2.8	0.1643	5.4	0.2265	-2.6	-1.86	0.0626
No. of children under 18	1.9	1.0762	1.9	1.0466	0.0	0.13	0.8955
Age 6-17	1.2	1.0885	1.3	1.1335	-0.1	-0.62	0.5365
Under age 6	0.7	0.8162	0.6	0.7629	0.1	1.04	0.2988
Work status (%):							
Not in labor force	43.2	0.4959	27.9	0.4493	15.3	4.4	0.0001
Full-time employed	24.9	0.4332	40.8	0.4923	-15.9	-4.74	0.0001
Part-time employed	20.3	0.4029	24.3	0.4297	-4.0	-1.32	0.186
Unemployed	11.6	0.32	6.9	0.254	4.6	2.17	0.0302

Note: Assuming equal variances for t-test of mean differences

Source: CPS 1993, 1999

Table 2.1 shows the demographic characteristics of non-metro south SFHFwC heads of 1993 and 1999 samples. The average age is 1 year lower in 1993 than in 1999. Their race composition has changed significantly. A higher proportion of white female-headed families came into the low-income group and a lower proportion of black female-headed families got out of it in 1993 than in 1999. Educational levels of SFHFwC heads seemed not to have improved apparently. The proportion of high school and some college

degrees increased from 1993 to 1999, but proportion of degrees below high school or above some college decreased. The number of children under age 18 was almost the same in the two years. Significant changes in work status of the female heads have occurred from 1993 to 1999. A higher proportion of female heads moved into labor force and got employed full time, indicating the improved economic and labor market situation in the 1990s.

As a comparison, table 2.2 shows the demographic characteristics of non-metro non-south SFHFwC heads of 1993 and 1999 samples. The female heads were averagely a little younger in 1993 than in 1999. Like in the south, a higher proportion of white and a lower proportion of black families were in the group with income below 150 percent poverty line in the non-south. However, unlike in the south, educational attainments of SFHFwC heads have been significantly improved from 1993 to 1999 in the non-south. The average number of children under age 18 of each family did not change for the two years. A significant higher proportion of female heads moved into labor force and got full-time employed in 1999.

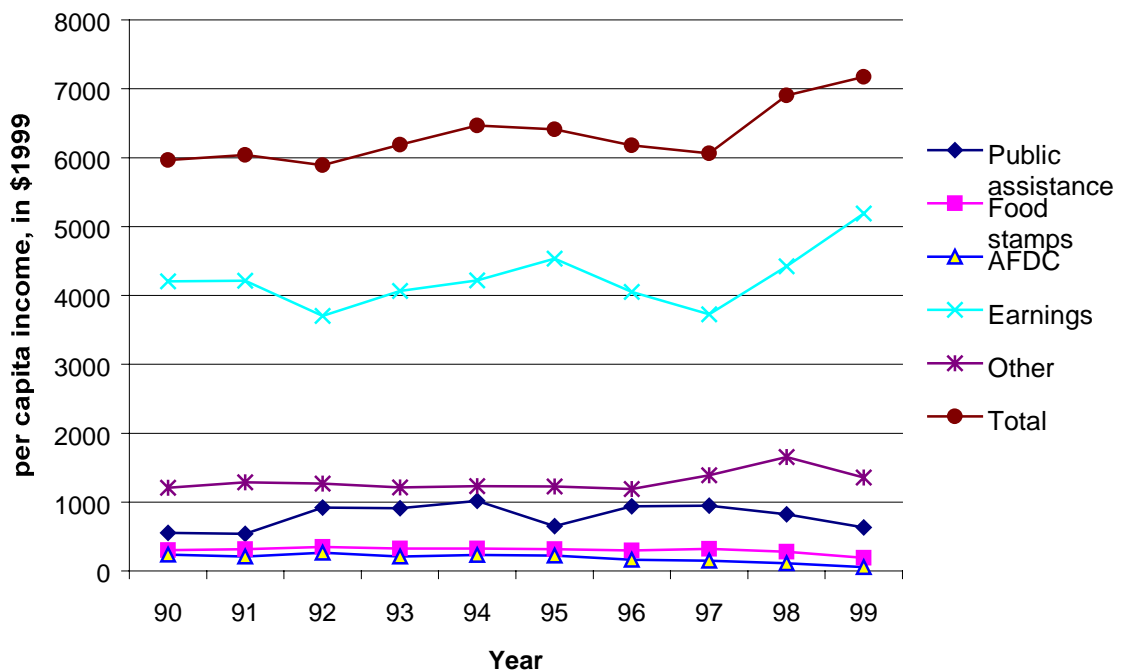
Differences of characteristics between the south and the non-south non-metro SFHFwC under 150 percent poverty line for each year can also be seen from tables 2.1 and 2.2. Generally, the non-south female heads were better educated than the south female heads for both years. The full time employment rates were higher in the non-south area than in the south. Unemployment rate was higher in the south in 1993 but lower in 1999.

2.5 Income trends and multiple sources of income

One of the primary reasons for our concern for the non-metro South SFHFwC is their high poverty rate. In 1999, 47.6 percent of these families had incomes below the poverty line. In this section, we shall examine how the SFHFwC's incomes and the multiple income sources have changed through the 1990s.

The average per capita total receipts of non-metro South SFHFwC remained relatively stable around \$6,000 (1999 dollars) in the 1990s except in the last two years when it increased to about \$7,000. This trend in total receipts is consistent with that of per capita family earnings. Before 1998, although the overall economic situation was

improving since the early 1990s, it did not bring significant income increases to the SFHFwC. Public assistance (including AFDC/TANF cash payments, imputed FS value, Medicaid, federal housing subsidy and school lunch benefits) declined in the late 1990s as a result of changes of the components of public assistance. No obvious trend in other income sources (all other income sources except unearned income and public assistance) can be observed (see figure 2.1).



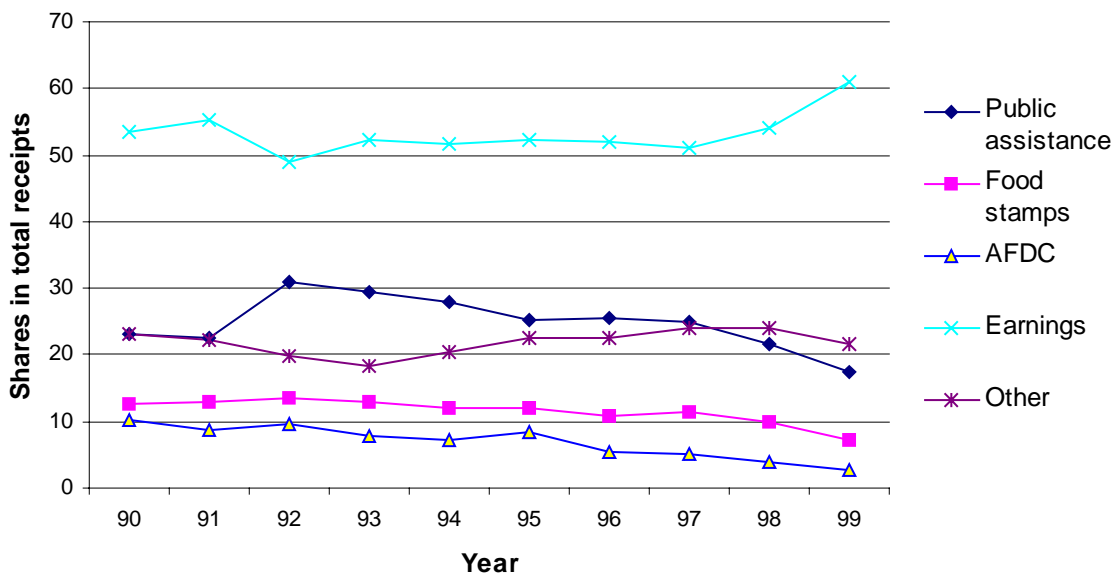
Source: CPS 1990 through 1999.

Figure 2.1 Sources of income for SFHFwC in non-metro South

Figure 2.2 shows the shares of different income sources. On average, earned income accounted for more than half of the total family receipts except in 1992⁵. Its share remained stable in the middle of the 90s, and began to increase after 1997. In contrast, the

⁵ Note that in figure 2.1, the average (mean) per capita public assistance is lower than per capita other incomes in most years, while in figure 2.2, the share of public assistance is higher than that of other incomes. This is possible since the shares of different sources of income here are computed as the mean of shares,

share of public assistance went down after 1997. Public assistance had been the second most important income source before 1998. The opposite trends of earnings and public assistance indicated their complementary roles in the SFHFwC's income generation strategy. Other incomes accounted for a little more than 20 percent of total receipts over the 1990s except in 1993. Overall, shares of FSP and AFDC/TANF benefits were trending downward through the decade and their shares were relatively low.



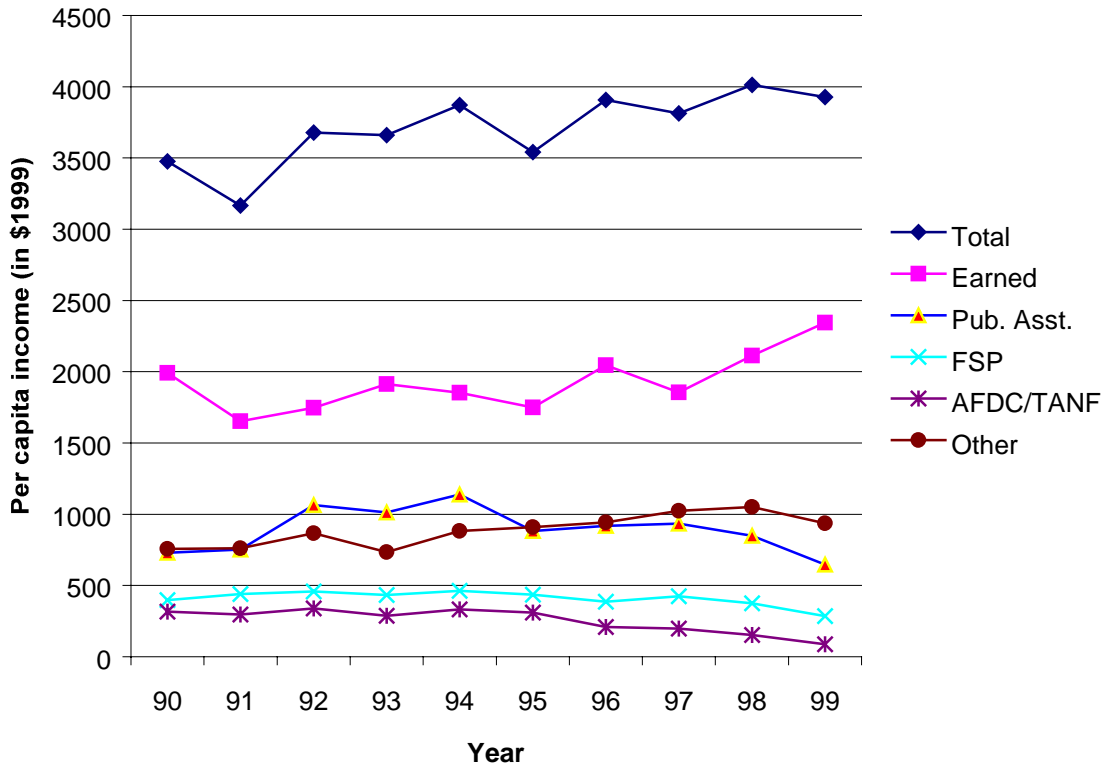
Source: CPS 1990 through 1999.

Figure 2.2 Shares of different sources of income in non-metro South SFHFwC in 1990s

The receipts and components of incomes for the SFHFwC who are poor and near poor (family incomes below 150% of poverty line) are very different than for all southern SFHFwC. As shown in figure 2.3, the patterns of total receipts of these families had a dramatic change in the middle of the 1990s. This group of families received less earned income but more public assistance than the SFHFwC as a whole did and the latter income

not the share of means, namely $\left(\frac{X_i}{Y_i}\right)$, but not $\frac{\overline{X_i}}{\overline{Y_i}}$, where X_i and Y_i are a specific source of income and total family receipts of *ith* family.

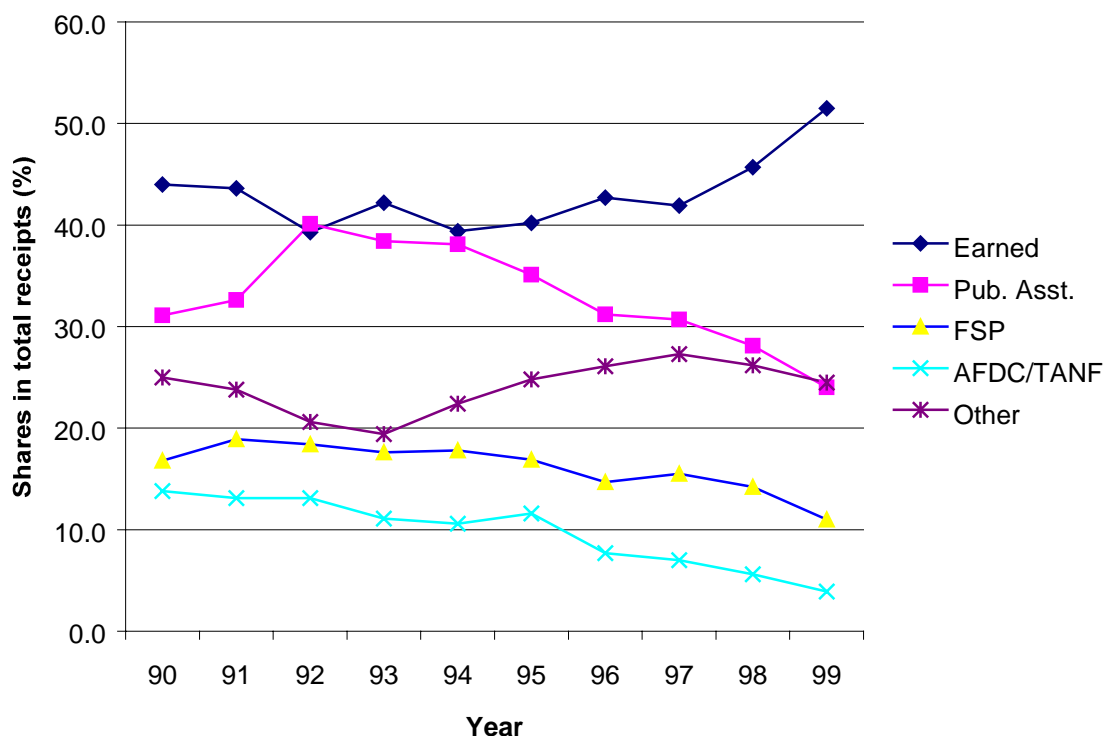
source fluctuated more widely during 1990s. In most years, public assistance was the second most important source of income for these families. AFDC/TANF and FS receipts were still low, but were obviously higher than for the SFHFwC sample as a whole.



Source: CPS 1990 through 1999.

Figure 2.3 Sources of income in poor and near poor non-metro South SFHFwC

The role of public assistance in the poor and near poor SFHFwC appears even more significant when we look at the shares of different sources of incomes (figure 2.4). The share of public assistance was even higher than that of earned income in 1992 and became the most important income sources for these families. However, the share of earned income was getting higher and higher, while that of public assistance lower and lower after 1992. Correspondingly, the major components of public assistance, AFDC and FSP receipts, was getting less and less important, although their shares were higher compared to the whole the SFHFwC as a whole.



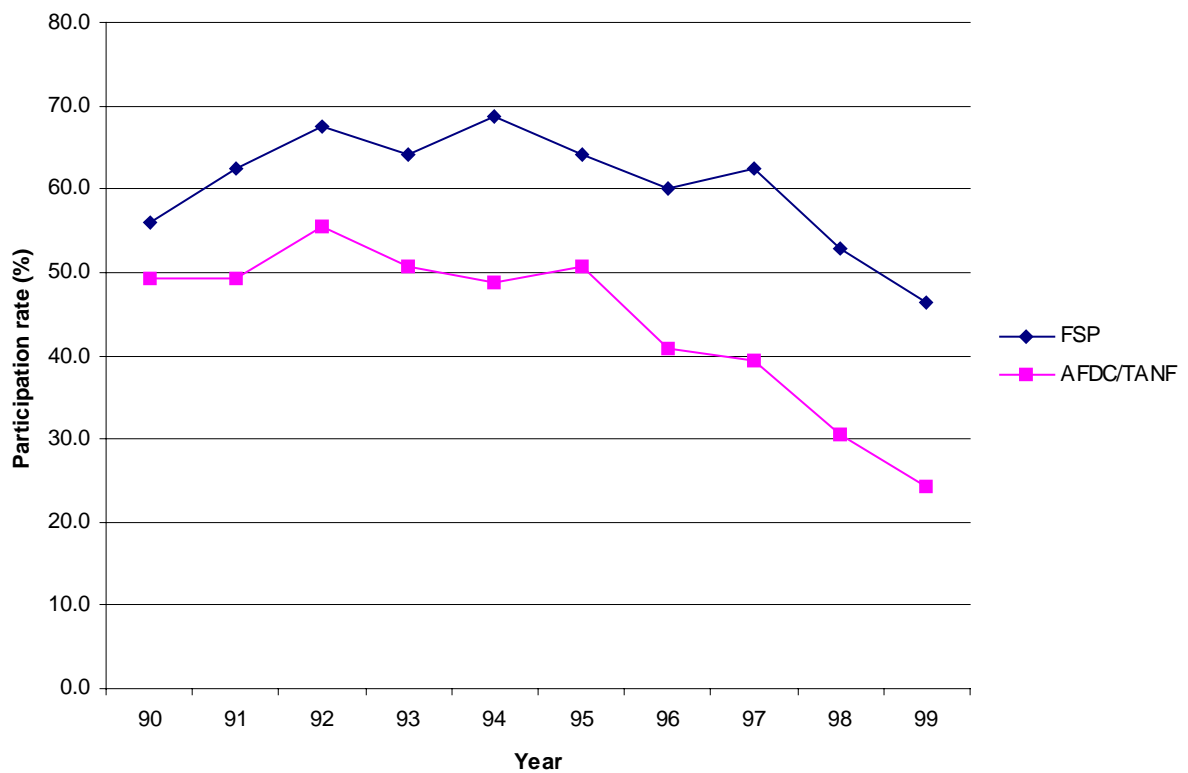
Source: CPS 1990 through 1999

Figure 2.4 Shares of different sources of total receipts in poor and near poor non-metro South SFHFwC

2.6 Participation in AFDC/TANF and FSP

In chapter 1 we introduced the AFDC/TANF and FSP and how important the two public assistance programs are to southern non-metro SFHFwC. In this section, we shall identify the basic trends in FSP and AFDC/TANF participation rates (calculated as the ratio of participants to families with incomes below 150% poverty line as a rough standard of eligibility for both programs) and the annual program benefits among the non-metro southern SFHFwC in the 1990s.

As shown in figure 2.5, participation rates for the two programs increased in the early 1990s. The FSP participation rate peaked in 1994 and began to decrease thereafter. A sharper drop in both program participation rates can be seen in the most recent two years. This trend reflects the effect of welfare reform to a degree. Participation rates for FSP have been much higher than those of AFDC/TANF.



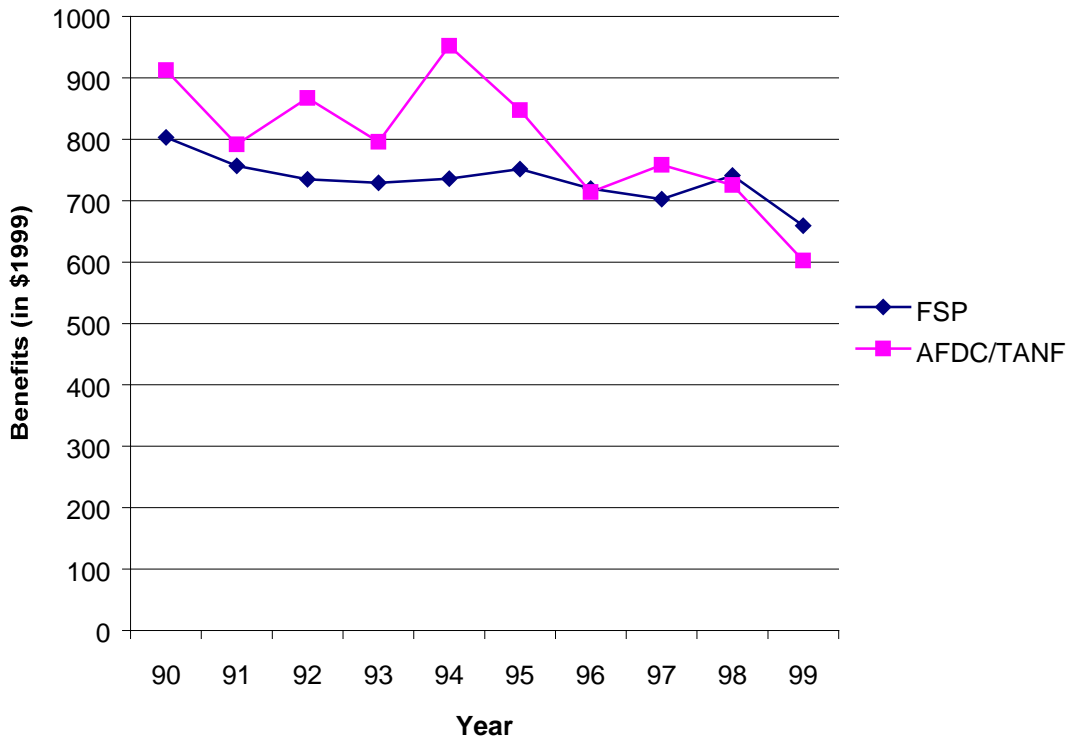
Source: CPS 1990 through 1999

Note: Recall that we just use 150% of federal poverty line as a rough and loose approximation to eligibility for both programs. Consequently, this graph may under-measure the actual participation rates.

Figure 2.5 Trend of FSP and AFDC/TANF participation rates among non-metro South SFHFwC in 1990s

Figure 2.6 shows the trend of average yearly per capita benefits from the AFDC/TANF and FSP for the respective program participants in the 1990s⁶. By and large, AFDC/TANF benefits are higher than FSP benefits during most of the years in the 1990s. However, the difference of the two has been decreased through the 1990s due to a more drastic drop in welfare benefits. In the most recent two years TANF benefits even began to fall under the FSP benefits.

⁶ The values are computed as follows: First divide a participating family's total yearly AFDC/TANF or FSP benefits by the number of persons in the family to get the per capita AFDC/TANF or FSP benefits for a family. Then compute the average per capita benefits for AFDC/TANF and FSP across families, respectively.



Source: CPS 1990-99.

Note: The values shown here are different than some published ones due to different ways of calculation. See appendix 1 for a comparison with the actual AFDC/TANF payments to all recipients.

Figure 2.6 Trend in per capita annual program benefits for non-metro South SFHFwC participants (in 1999 dollar)

2.7 Eligibility changes and new restrictions on TANF and FSP

PRWORA replaced AFDC with TANF and prescribed new eligibility rules for participation. These mainly include assets limits, income limits, time limits, and work requirements. States have their own authority to set rules according to broad federal guidelines. Under AFDC, families receiving welfare assistance were generally not allowed to accumulate more than \$1,000 in countable resources. Under TANF, many states have adjusted their asset limits for participation. Most of the southern states increased asset limits to more than \$2,000 following PRWORA. Income eligibility limits have also changed, but not by much. Under AFDC, recipient families were subject to two income eligibility tests. First, a family's gross income must be less than 185 percent of

the needed standard defined by each state. Second, its net income must be less than the payment standard (the amount from which net income is subtracted to compute the benefit). Many southern states have maintained these two rules. Alabama and Louisiana only prescribe that net income must be less than the payment standard. Arkansas prescribes that monthly net income must be \$223 or less. Florida prescribes that gross income must be less than 130 percent of the federal poverty level. Virginia prescribes that families subject to time limit must have earnings less than the federal poverty line. Table 2.3 shows asset limits and income limits for a family of three in the South under TANF.

Table 2.3 Asset limits and income eligibility limits for a family of three with no unearned income or child care expenses

State	Asset limit	Income limit in October 1997 (13 th month of earnings)	Change from under AFDC	Estimated increase in income limit for an extra family member in the South non-metro SFHFwC
Alabama	\$2,000/3,000 ¹	\$210	-40	80
Arkansas	3,000	560	270	174
Florida	2,000	810	320	169
Georgia	1,000	510	0	114
Kentucky	2,000	650	30	156
Louisiana	2,000	310	30	102
Mississippi	1,000	460	0	240
North Carolina	3,000	630	0	145
South Carolina	2,500	630	20	195
Tennessee	2,000	830	60	284
Virginia	1,000	1,110 ²	30	240
West Virginia	2,000	440	100	108

Source: extracted from Gallagher, 1998.

Note: 1. \$2,000 for assistance units without a member age 60 or over, and \$3,000 for assistance with a member age 60 or over.

2. Limit is based on rules that apply to families subject to time limit.

Under AFDC, there were no restrictions on the duration a family was eligible for the program. However, under PRWORA, the time that recipients receive TANF assistance cannot exceed 60 months for their lifetime. States can set limits that are more restrictive

than the maximum 60 months prescribed by federal law. In the southern twelve states, there are several types of time limits. In Alabama, Kentucky, Mississippi and West Virginia, recipients are eligible for TANF for the full 60 months. Benefits will be terminated after this. In Arkansas and Virginia, the time limits are 24 months. Virginian recipients can be re-eligible after 2-3 years, subject to a 60-month lifetime limit. In Florida, Louisiana and North Carolina, recipients can receive assistance for 24 months out of every 60 months. Georgia has a time limit of 48 months. In Tennessee, after 18 months of assistance, the family must wait at least three months before becoming re-eligible for assistance, and at that point, the 18-month limit applies again (Gallagher, 1998).

Moving welfare recipients into employment is the primary goal of the welfare reform. PRWORA requires that non-exempt TANF recipients (for instance, single parents of children under age 6 who are unable to obtain child care) participate in work (the definitions of work vary by states) activities within 2 years and that states meet certain work participation rates. Most of the southern states adopted this rule except North Carolina and Virginia, which require that recipients work within 90 days. If recipients fail to comply with the work requirements, they are subject to some months of partial or full benefit reduction. The most severe sanction could be as long as 6 months of partial or full benefit reduction.

SFHFwC recipients are generally exempt from work for a specific period of time based on the age of youngest child in the families. Table 2.4 lists the exemption in the southern twelve states.

Table 2.4 Work requirement exemption based on age of youngest child

State	Exempt while child under	Limited to 12 total months	State	Exempt while child under	Limited to 12 total months
Alabama	1 year	No	Mississippi	1 year	Yes
Arkansas	3 months	Yes	North Carolina	1 year	No
Florida	3 months	No	South Carolina	1 year ¹	No
Georgia	No exemption	No	Tennessee	4 months	No
Kentucky	1 year	Yes	Virginia	18 months ²	No
Louisiana	1 year	Yes	West Virginia	1 year ³	No

Source: extracted from Gallagher, 1998

Note: 1. Parents under age 25 who have not completed their HS education are required to comply with a activities regardless of the age of the youngest child.
2. Parents are exempt while the youngest child is under 6 weeks old for children subject to the family cap.
3. For subsequent children, single parents may receive an exemption for a total of 6 months between the beginning of the last trimester of pregnancy and when the newborn reaches 6 months of age.

With respect to the FSP, PRWORA also has some relevant provisions for rule changes that may affect SFHFwC. The major emphasis is still on moving recipients into work. Non-exempt individuals would be ineligible to continue to receive food stamps if they receive food stamps for 3 months in a preceding 36-month period while they did not work at least 20 hours per week (averaged monthly), or participate in a work program for at least 20 hours a week (FSN, USDA, 1999). Also, families receiving food stamp benefits are subject to sanction in the event of TANF sanction due to noncompliance with TANF work requirement⁷.

2.8 Summary

This chapter introduced the CPS and presented some descriptive information on non-metro SFHFwC. Focus was on the southern families who are of special interest in the empirical analysis. Statistical summaries were provided on basic demographic characteristics, income trends and income composition. Welfare and FSP participation rate trends were also presented. Race composition and work status have changed much from 1993 to 1999. Total incomes and the share of the income sources also changed across years. Educational attainments have improved for non-south SFHFwC heads. The chapter also discussed the changes of eligibility for TANF and FSP due to the welfare reform. The next chapter will present the theoretical framework for modeling the program participation.

⁷ Because eligibility is determined based on a combination of factors, many of which are not discernable in the CPS data, we use a loose definition of eligibility in the subsequent chapter. The group of interest is those SFHFwC whose total income is less than 150% of federal poverty line. this definition may include some households that are ineligible for other reasons.

Chapter 3: Theoretical Framework

3.1 Chapter overview

This chapter presents a theoretical framework for modeling participation in FSP and AFDC/TANF. Section 3.2 presents a general simple model with all exogenous explanatory variables, and then discusses application to participation in the FSP and welfare programs. Section 3.3 extends the model of FSP participation by incorporating an endogenous explanatory variable, participation in welfare program. Section 3.4 presents a brief summary.

3.2 Model of program participation

The model of program participation used in this study is based on simple consumer theory. An SFHFwC is assumed to be aware of its utility of participation or nonparticipation in a program. Furthermore, the SFHFwC makes its decision to participate only if the utility of participation exceeds that of nonparticipation. Assume the SFHFwC's utility function for participation is $U_1(Y, P)$, where Y denotes the family's disposable income, and P denotes taste-related effects of participating in the program. Also assume the SFHFwC's utility function of nonparticipation is $U_2(Y)$. Y is usually a function of the female head's work hours H , hourly wage W and other unearned income N . It is also determined simultaneously by the decision to participate in the program, since the program benefits will affect a family's income. Therefore, Y can be expressed as $Y = Y(W, H, N, P)$. A decision to participate is made only when

$$U_1(Y, P) > U_2(Y). \quad (3.1)$$

The model is also often developed by defining a critical value I^* of the random index $I = \beta'x + \varepsilon$, which reflects the family's attributes and taste (also distaste) of program participation. The decision to participate will occur only when $I > I^*$ (Epperson et al., 1980).

Another way of modeling program participation is to find out the minimum benefit requirement from participation (Levedahl, 1995). An SFHFwC participates only if

$$B - B^*(X) \equiv \Delta B(X) \geq 0, \quad (3.2)$$

where B is the received benefit from participation, $B^*(X)$ is the minimum benefit requirement at which the net utility of participation is zero, and is a function of a set of exogenous variables X . Considering that a family is not certain about either B or $B^*(X)$, and denote the uncertainty term as e , the participation criterion then is:

$$\Delta B(X) \geq e. \quad (3.3)$$

Participation in FSP

Let P_{fs} be the participation variable, $P_{fs}=1$ for actual FSP participation, $P_{fs}=0$ for nonparticipation. As above, an SFHFwC's utility function is $U_1(Y, P_{fs})$ while participating, and $U_2(Y)$ while not participating. If participation in FSP were costless, it would always have $U_1 > U_2$, and eligible families would always participate (Households are assumed to be aware of their eligibility). However, this is quite different from reality. Many factors have been found to cause nonparticipation among eligibles.

First, participation will change a family's disposable income. Prior to participation,

$$Y(W, H, N) = N + WH, \quad (3.4)$$

while during participation,

$$Y(W, H, N, P_{fs}) = N + WH + P_{fs}(B - C), \quad (3.5)$$

where B is the market value of received food stamp benefit, C is the monetary cost of participation in FSP, such as costs for transportation and reporting (Hagstrom, 1995). The last term in equation (3.5) could be negative.

Second, besides monetary cost, it has been widely recognized that participation in FSP or welfare can bring stigma (or distaste) to the participants. Moffitt (1981) proposed that a feeling of stigma could most likely explain the nonparticipation of eligible people. Many families consider welfare participation to be "demeaning, socially undesirable, destructive of self-respect..."(page 753).

Although stigma from program participation can not be directly measured, it can be discerned by a number of proxies such as the potential participant's age, race, marital status, educational level, work status, local unemployment rate and the number of

dependent children etc.. For example, Coe (1983) found that unmarried men were more likely to have negative feelings toward receiving welfare, a factor accounting for 35 to 56 percent of the lower FSP participation rates of the group. Contrarily, eligibles with more dependent children were less prone to feel stigmatized from receiving food stamp assistance. Other non-monetary costs include administrative hassles, requiring program information, and time spent on complicated application process, etc..

Thus, family disposable income and cost of participation are the two categories of factors affecting a family's decision to participate or not in FSP. The propensity for participation can implicitly be expressed as a function

$$P_{fs}^* = f(Y, Z), \quad (3.6)$$

where Z denotes a set of special characteristics, such as household demographic characteristics, socioeconomic characteristics and program characteristics. These characteristics not only influence a potential participant's feeling of stigma as mentioned above, but also determine people's knowledge about FSP, their freedom of choice and the accessibility of FSP. In terms of the demographic attributes, for instance, people with high educational levels may know more about FSP and be more aware of their eligibility. Former FSP or other welfare program participants are more informed about FSP and are more likely to participate. Non-metropolitan residents are less likely to participate because they are more likely to believe that they are ineligible for both financial and nonfinancial reasons (Coe, 1983). For example, 1999 CPS data show that FSP participation rate for non-metropolitan SFHFwC is 5 percentage points lower than that for metropolitan SFHFwC. Higher local unemployment rates may reduce people's options other than FSP participation. A good public transportation system may increase participation rates because it lowers the cost to the participants. Program characteristics are also likely to have effects on FSP participation. Dion and Pavetti reported that confusion about FSP eligibility criteria was the primary reason for much non-participation among eligibles, especially after welfare reform (Dion and Pavetti 2000).

Participation in welfare program

The theoretical framework for participation in AFDC/TANF is basically the same as that for participation in FSP. A SFHFwC's utility is also assumed to be a function of the

disposable income Y and a dummy variable P_{wel} , namely, $U(Y, P_{wel})$. A family chooses to participate if the expected utility of participation outweighs that of nonparticipation. A difference worth mentioning is the income change when participating in welfare program:

$$Y = WH + N + P_{wel}B. \quad (3.7)$$

B is the potential welfare benefit and

$$B = G - t(WH + N), \quad (3.8)$$

where G is the gross government welfare payment, t is the marginal welfare tax rate imposed when on welfare (Moffitt, 1981). Welfare participation thus can also be implicitly expressed as the function of disposable income and demographic, socioeconomic and program characteristics, namely,

$$P_{wel}^* = f(Y, Z), \quad (3.9)$$

or in linear form of

$$P_{wel}^* = X_2\beta_2 + \varepsilon_2. \quad (3.10)$$

where $X_2 = (Y, Z)$

Again, P_{wel}^* denotes the propensity to participate and is unobservable. Real occurrences of participation P_{wel} are observed. $P_{wel} = 1$ when $P_{wel}^* > 0$, and $P_{wel} = 0$ when $P_{wel}^* < 0$.

As in the case of FSP, there is a strong feeling of stigma related to the participation in welfare program as argued by Moffitt (1981). The stigma is reflected by a combination of demographic attributes, such as age, marital status, education and number of children etc.. Local economic situation and unemployment rate also have impact on welfare participation.

Certain characteristics of the welfare program also make the model of welfare participation different from that of FSP participation, especially after the welfare reform in 1996. The major one is the time limit on receiving welfare benefits. As introduced in chapter two, under PRWORA, a person can receive cash assistance only for a maximum of 60 months during his or her lifetime. Although there are some variations in implementation, states do adopt time limits. For example, of the twelve southern states, five have 60 month lifetime limit, four have 24 month limit out of every 60 months.

Alabama has as few as 24 month lifetime limit (Gallagher, 1998). This regulation has led to the banking or conserving of benefits in case of future adversity, hence lower welfare participation rates among the eligibles (Hazarika, et al., 2000).

3.3 A model of FSP participation incorporating AFDC/TANF participation

One major purpose of this study is to examine the effect of welfare program participation on FSP participation and whether it has changed after the welfare reform. Therefore, participation in welfare is incorporated while modeling FSP participation. Equation (3.6) is now extended into

$$P_{fs}^* = f(Y, Z, P_{wel}) \quad (3.11)$$

Equation (3.11) is a structural form with an endogenous explanatory variable P_{wel} , which is simultaneously determined with participation in FSP.

As will be discussed in the subsequent chapter, estimation of 3.11 needs to account for the endogeneity of P_{wel} to the FSP participation decision. Otherwise, the parameter estimates will be biased.

3.4 Summary

This chapter presented theoretical framework for the participation in the FSP and welfare program. The theoretical model of program participation is based on simple consumer theory. We first presented the single probit model with all exogenous explanatory variables. Then a structural probit model for FSP participation was presented, taking into account participation in welfare as an endogenous explanatory variable. This model allows us to isolate the impact of welfare participation, holding all other factors constant, on food stamp participation. The empirical method will be discussed in the next chapter.

Chapter 4: Empirical Method

4.1 Chapter overview

This chapter provides an empirical model of the factors affecting SFHFwC's participation in FSP and AFDC/TANF in 1993 and 1999, two years before and after the welfare reform. Section 4.2 briefly discusses the selection of the sample used in the study. Section 4.3 presents the reduced form probit, the bivariate probit, the structural form probit models and the estimation techniques. Section 4.4 explains the variables included in empirical models. Summary of the chapter is presented in Section 4.5.

4.2 Sample selection

As mentioned in chapter two, the sample of this study is drawn from the 1993 and 1999 rounds of the CPS. Because the CPS does not contain data about family resources, such as vehicles, houses and other assets, which are important determinants of program eligibility, income limits are utilized only to identify eligibles for the two programs. SFHFwC with incomes under 150 percent of federal poverty line are selected as an approximate sample eligible for both FSP and AFDC/TANF program. While this is only a rough instrument for determining program eligibility, given data limitations, it is probably the most reasonable. 471 SFHFwC are selected for 1999 and 692 for 1993 from US non-metropolitan areas⁸. These families are assumed to be aware of their eligibility for both programs, but inclusion of education variables helps account for differential knowledge about the program. Therefore, we ignore the possibility that a family is actually eligible for participation in the programs but either wrongly considers it is ineligible or is unaware of its eligibility. This probability does exist according to the study by Levedahl (1995).

4.3 Empirical models

⁸ Because of the small sample size of non-metro south SFHFwC in the CPS, the sample is expanded to include the whole nation. A dummy variable representing the south will be defined to examine the effect of residing in the south on SFHFwC's FSP and welfare participation.

Empirical analysis in this study is realized through three types of probit models, the simple (reduced-form) probit, the bivariate probit, and the structural probit. The simple probit model shows FSP and welfare participation as a function of all exogenous explanatory variables. Participation in the two programs is treated separately. The exogenous variables in the reduced form include all exogenous variables affecting the decision to participate in either program. This specification implies that the reduced forms are derived by a simultaneous system that jointly determines participation in both programs. The bivariate probit model also shows FSP and welfare participation as a function of exogenous variables, but allows for correlation between the unobserved components of each. The reason for using the bivariate model is, if there exists a significant correlation between participation in the two programs, this model may produce more efficient parameter estimates than the reduced-form probit model. The structural probit model takes the interaction between FSP participation and welfare participation into consideration. This study focuses on the effect of welfare participation on SFHFwC's FSP participation decision. That is, welfare participation can be considered to be an endogenous variable in the FSP participation model. It affects FSP participation, but it itself is also determined by the latter. Due to this joint determination of participation in the two programs, estimation of the structural model involves a two-stage method that will be discussed later.

Comparison of estimates will be made between models and across years. Comparison between models tells us what we gain by using different model specifications. The different models produce slightly different information. Comparison between 1993 and 1999 helps us understand how the patterns households' participation in FSP and welfare, especially the effect of welfare participation on FSP participation, have changed after welfare reform. Comparison between south and non-south will also be made to examine how residing in south changes the participation in FSP and welfare.

4.3.1 Reduced-form probit model

Let X_{fs} denote all exogenous variables affecting FSP participation, and X_{wel} all exogenous variables affecting AFDC/TANF participation. Also denote $X = (X_{fs}, X_{wel})$. The reduced form probit model of FSP participation can be specified as

$$P_{fs}^* = \beta_1' X + \varepsilon_1 \quad P_{fs} = 1, \quad \text{if } P_{fs}^* > 0$$

$$= 0, \text{ otherwise}$$

$$\Pr ob(P_{fs} = 1) = \Pr ob(\varepsilon_1 > -\beta_1' X) = 1 - \Phi(-\beta_1' X) = \Phi(\beta_1' X) \quad (4.1)$$

where $\varepsilon_1 \sim N(0,1)$, $\Phi(\cdot)$ is the normal cumulative density function. The same type of model can be constructed for AFDC/TANF participation, i.e.

$$P_{wel}^* = X\beta_2 + \varepsilon_2 \quad P_{wel} = 1, \quad \text{if } P_{wel}^* > 0$$

$$= 0, \text{ otherwise}$$

$$\Pr ob(P_{wel} = 1) = \Pr ob(\varepsilon_2 > -\beta_2' X) = 1 - \Phi(-\beta_2' X) = \Phi(\beta_2' X) \quad (4.2)$$

where $\varepsilon_2 \sim N(0,1)$.

The simple probit model is estimated using maximum likelihood. Generally, for each of above equations, denoting the left-hand side as y ($y = 1, 0$), the right-hand side as $\beta' x + \varepsilon$, then the likelihood function can be written as:

$$L = \prod_i [\Phi(\beta' x_i)]^{y_i} [1 - \Phi(\beta' x_i)]^{1-y_i}$$

Taking logs of the equation, we get:

$$\ln L = \sum_i [y_i \ln \Phi(\beta' x_i) + (1 - y_i) \ln(1 - \Phi(\beta' x_i))]$$

The first order condition for maximization is

$$\frac{\partial \ln L}{\partial \beta} = \sum_i \left[\frac{y_i \phi_i}{\Phi_i} + (1 - y_i) \frac{-\phi_i}{(1 - \Phi_i)} \right] x_i = 0$$

where $\phi(\cdot)$ The solutions to equation (4.8) yields ML estimates (Greene, 1993).

4.3.2 Bivariate probit model

Participation in FSP and AFDC/TANF is also modeled in a bivariate probit framework. The general specification would be

$$\begin{aligned}
 P_{fs}^* &= X\beta_1 + \varepsilon_1 & P_{fs} &= 1, \quad \text{if } P_{fs}^* > 0 \\
 & & &= 0, \text{ otherwise} \\
 P_{wel}^* &= X\beta_2 + \varepsilon_2 & P_{wel} &= 1, \quad \text{if } P_{wel}^* > 0 \\
 & & &= 0, \text{ otherwise}
 \end{aligned} \tag{4.3}$$

where ε_1 and ε_2 are jointly identically and normally distributed, i.e.

$(\varepsilon_1, \varepsilon_2) \sim BVN(0,0,1,1, \rho)$ (Greene, 1993).

Estimation of the bivariate probit model involves a bivariate normal cumulative distribution function Φ_2 and a density function ϕ_2 :

$$\Phi_2(x_1, x_2, \rho) = \int_{-\infty}^{x_2} \int_{-\infty}^{x_1} \phi_2(z_1, z_2, \rho) dz_1 dz_2,$$

and

$$\phi_2(x_1, x_2, \rho) = \frac{e^{-(1/2)(x_1^2 + x_2^2 - 2\rho x_1 x_2)/(1-\rho^2)}}{2\pi(1-\rho^2)^{1/2}}.$$

Define

$$q_{i1} = 2y_{i1} - 1, \quad q_{i2} = 2y_{i2} - 1,$$

$$z_{i1} = \beta_1' \mathbf{x}_{i1}, \quad z_{i2} = \beta_2' \mathbf{x}_{i2},$$

$$w_{i1} = q_{i1} z_{i1}, \quad w_{i2} = q_{i2} z_{i2}$$

and

$$\rho_{i*} = q_{i1} q_{i2} \rho,$$

then the likelihood function would be

$$\ln L = \prod_i \ln \Phi_i(w_{i1}, w_{i2}, \rho_{i*}).$$

Solving the first-order conditions of above function yields the ML estimates (Greene, 1993).

4.3.3 Structural form probit

We now incorporate the interaction between the decisions to participate in FSP and AFDC/TANF. In other words, an SFHFwC is considered to make joint decision to participate in the two programs. In the bivariate probit model, all the explanatory variables are assumed to be exogenous. In the structural probit model of, say FSP participation, participation in AFDC/TANF is included as an endogenous explanatory variable. The dummy variable P_{wel} is itself determined by the decision to participate in FSP. Thus the structural probit model of FSP participation is given by:

$$\begin{aligned} P_{fs}^* &= \beta_1' X_{fs} + \gamma_1 P_{wel} + \varepsilon_1 & P_{fs} &= 1, \quad \text{if } P_{fs}^* > 0 \\ & & &= 0, \quad \text{otherwise} \\ P_{wel}^* &= \beta_2' X_{wel} + \gamma_2 P_{fs} + \varepsilon_2 & P_{wel} &= 1, \quad \text{if } P_{wel}^* > 0 \\ & & &= 0, \quad \text{otherwise} \end{aligned} \quad (4.4)$$

where $\varepsilon_1 \sim N(0,1)$, $\varepsilon_2 \sim N(0,1)$ ε_1 and ε_2 are correlated, the coefficient γ_1 is used to examine the effect of participation in AFDC/TANF on participation in FSP. As will be discussed soon, time limits (for 1999) and marginal welfare tax rates on earned and unearned incomes only affect welfare participation; they serve as the instruments for the endogenous variable P_{wel} . The equation system is identifiable.

Estimation of equation (4.4) calls for two steps: estimation of reduced form and estimation of structural form. We first estimate the reduced form (equation (4.2)) by probit ML as done in section 4.3.1, then we substitute the predicted value of P_{wel}^* into (4.4) in place of P_{wel} , and then re-estimate the structural equation by probit ML (Maddala, 1983).

4.4 Variables

The variables included in the models are explained in table 4.1.

Table 4.1 Variable definitions and sample means

Variable	Definition	1999				1993			
		Nation		South.		Nation		South	
		Mean	Std. Dev	Mean	Std. Dev	Mean	Std. Dev.	Mean	Std. Dev
PARTWEL	Dependent variable, dummy, =1 if participation in AFDC/TANF, =0 otherwise	0.24	0.46	0.15	0.36	0.39	0.49	0.36	0.48
PARTFS	Dependent variable, dummy, =1 if participation in FSP, =0 otherwise	0.45	0.50	0.44	0.50	0.58	0.49	0.61	0.49
SOUTH	Dummy, =1 if south, =0 otherwise	0.29	0.46	1.00	0	0.37	0.48	1.00	0
LOGAGE	Natural log of age	3.48	0.25	3.51	0.24	3.47	0.24	3.49	0.24
BLACK	Dummy, =1 if black, =0 otherwise	0.13	0.33	0.39	0.49	0.23	0.42	0.52	0.50
NONWHITE	Dummy, =1 if other non-white, =0 otherwise	0.07	0.25	0	0	0.07	0.33	0.01	0.11
HISPANIC	Dummy, =1 if Hispanic, =0 otherwise	0.11	0.31	0.03	0.17	0.06	0.24	0.02	0.12
LESSHIGH	Dummy, =1 if educational level is less than high school, =0 otherwise	0.22	0.41	0.33	0.47	0.30	0.46	0.34	0.48
HIGH	Dummy, =1 if educational level is high school, =0 otherwise	0.67	0.47	0.58	0.50	0.61	0.49	0.57	0.50
FOWNU17	Number of Children 6-17 years old	1.31	1.12	1.38	1.10	1.29	1.09	1.39	1.10
FOWNU6	Number of Children under age 6	0.57	0.76	0.46	0.75	0.63	0.79	0.58	0.75
TIME24	Dummy, =1 if the time limit on TANF	0.08	0.27	0.20	0.40				

	eligibility is <=24 months, =0 otherwise								
TIME48	Dummy, =1 if the time limit on TANF eligibility is >24 and <=48 months, =0 otherwise	0.10	0.31	0.11	0.31				
T24OUT	Dummy, =1 if the time limit on TANF eligibility is 24 months out of 48, 60 or 84 months =0 otherwise	0.08	0.28	0.08	0.27				
MPEREARN	Monthly per capita earned income	204.9	179.3	195.4	184.6	130.9	158.2	138.7	162.2
MPERUN	Monthly per capita unearned income (excluding AFDC/TANF receipts)	73.2	101.5	79.1	110.6	62.5	95.8	54.5	93.2
INCOME	Total income	277.9	178.8	274.6	178.2	193.4	168.8	193.3	167.6
UNEMPR	State non-metropolitan unemployment rate	6.00	1.77	6.05	1.15	8.24	2.07	8.36	1.93
EARN_R	Welfare program marginal tax rate on earned income after disregard	0.60	0.24	0.53	0.37				
UNEARN_R	Welfare program marginal tax rate on unearned income	0.47	0.14	0.35	0.15	0.44	0.14	0.31	0.12
No. of Obs.		471		138		692		259	

Source: CPS 1999 and 1993.

Note: Except PARTES and PARTWEL, other variables such as incomes and number of children, etc. are all assumed to be exogenous, although, strictly speaking, they could be endogenous in some cases.

Black and other non-white are the classes of race used in the model; the omitted race is white. So the effect of being black and other non-white is compared to that of being white. With respect to education, attainments other than lower than high school and high school are included in the subsequent models. The omitted class is some college or higher degree. The effect of obtaining educational levels of high school or lower than high school degree is compared to that of other higher educational levels.

The time limit variables only apply to the TANF program, as time limits on welfare participation were only introduced after the reform in 1996. Three categories of time limits are used. The first is 24 months or less than 24 months. The second is between

24 and 48 months. The third is 24 months out 48, 60 or 84 months. The omitted time limit category is 60 months or no time limit (Gallagher, 1998, see appendix 2). Thus the effect of the included time limit categories is compared to the general 60 months time limit (or no limit) guided by PRWORA.

Monthly per capita earned/unearned family income (nominal) is obtained by dividing yearly total family earned/unearned (excluding public assistance) by 12 and the number of persons in the family. The values of variable INCOME are just the sum of monthly per capita earned and unearned income.

The welfare program marginal tax rates on earned/unearned income for 1999 were calculated by Hazarika (2000), based on the survey of state welfare programs by Gallagher (1998). These two tax rates are implicit since only welfare participants are subject to it. The marginal tax rate on earned income is 0.67 across all states for 1993⁹. The CPS does not identify the county of residence, so the state average unemployment rates for non-metropolitan areas (Hazarika, et al., 2000) are used in the model (See appendix 3).

Several variables, particularly the demographic variables, may have counteracting effects on SFHFwC's participation in programs. For instance, the older a female head is, the more program information she may have. But she may feel more stigma from receiving public assistance at the same time. Also a higher educational level may increase a female head's understanding of and access to the programs, but again may cause more stigma. The net effect of these variables thus cannot be predicted. The stigma of participation is captured by the composite effects of age, race, educational level, earned/unearned income, and unemployment rate etc..

4.5 Summary

This chapter presented the empirical method used in this study. The use of three types of probit models was justified. The reduced-form probit model treats the participation in FSP or welfare as a function of exogenous explanatory variables. The bivariate probit model takes into account the correlation between the two programs participation. It is expected to give more efficient estimates if significant correlation does

⁹ I.e. welfare benefits are reduced by \$67 for every \$100 in earned income.

exist. The structural probit model is used to estimate the effect of welfare participation on SFHFwC's FSP participation, due to the endogenous nature of variable P_{wel} . The analysis will be realized through the comparison between models, years and locations. The chapter also presented variable definitions and sample descriptions.

Chapter 5: Estimation Results

5.1 Chapter overview

This chapter presents the estimation results of probabilities of participation in the food stamp and welfare programs for 1999 and 1993. Samples of US non-metro SFHFwC with family incomes below 150 percent of the federal poverty line are used. To examine the impact of living in South, which is of special interest in this study, a dummy variable representing residence in the south is used¹⁰. The chapter compares the results from estimation of different models, different specifications of the same model, and across different years.

Discussion is focused on the estimation results for the determinants of FSP participation. The signs and statistical significance of key variables are discussed, as well as changes from specification to specification. Also the mean difference in program participation across residence and other discrete variables is discussed. For continuous independent variables such as earned/unearned income, elasticities of program participation are referred to.

5.2 Estimation results

5.2.1 Results for 1999

Reduced-form probit results

Table 5.1 presents the estimates of probabilities of participation in FSP and welfare for 1999, using the reduced-form probit model. Only a few of the variables are significant. Living in the South has a negative but insignificant impact on FSP participation; it has a negative and significant impact on welfare participation. In 1999, the mean TANF participation rates for non-metro south SFHFwC was about 15 percent, and for non-metro non-south, about 27 percent (See appendix 4). The predicted probability of welfare participation using the reduced-form probit estimation results is

¹⁰ Because of the small sample size for non-metro southern SFHFwC, the entire sample of US non-metro SFHFwC is used here; we assume that the effect of southern residence is captured by an intercept shifter.

0.08 for households in the South vs. 0.23 for non-south¹¹. This means that holding other characteristics such as education, number of children, etc. constant, SFHFwC in the south are 15 percentage points less likely to participate in TANF than their non-south counterparts. The negative sign of the estimate of South dummy variable is the same as the finding of Capps and Kramer (1985), but different from that of Moffitt (1992). Both Capps & Kramer and Moffitt found an insignificant impact of residing in the South on the probability of participation in welfare. This could be because they used different data. Capps and Kramer used Consumer Expenditure Diary Survey (CEDDS) data and Moffitt used SIPP data. Also, they used data from earlier years. The effect of southern residence may have changed over time. For example, Moving welfare recipients into work in some pioneering southern states after 1996 may cause less probability of participation.

In this study, income is the most significant determinant of participation in both public assistance programs. The elasticity of welfare participation with respect to monthly per capita earned income is -0.20¹². This means that a percentage point increase in earned income would cause the probability of welfare participation to decrease by 0.002. The elasticity of welfare participation with respect to monthly per capita unearned income is -0.05. Thus, participation is far more sensitive to earned income than to unearned income. Local labor market conditions, as measured by the unemployment rates, have significant and positive impact on welfare participation, with an marginal effect of 0.03. This means that 1 percentage point higher unemployment rate will increase probability of welfare participation by 3 percentage points. The above results are consistent with the theory. With higher income, families are more likely to be or perceive themselves to be ineligible for welfare. Also income may increase the stigma of receiving assistance. However, higher local unemployment rates may reduce a family's stigma related to receiving assistance or reduce administrative obstacles to eligibility.

¹¹ The predicted probability for dummy variables is computed at the sample means, namely, $\Phi(\bar{x}\hat{\beta})_{SOUTH=0}$ and $\Phi(\bar{x}\hat{\beta})_{SOUTH=1}$, where $\Phi(\cdot)$ is the normal cumulative probability function, \bar{x} is a vector of sample means, $\hat{\beta}$ is the estimates vector

¹² Elasticity of continuous variables here refers to the absolute percentage point change in the probability of participation with a percent change of a certain variable. It is evaluated at the point of sample means; namely, it is the marginal effect multiplied by the sample mean. Marginal effect is computed as $\phi(\bar{x}\hat{\beta})\hat{\beta}$, where $\phi(\cdot)$ is a normal density function.

Some of the variables of interest were not significant. For instance, the time limit variables, which represent state-specific lifetime limits on welfare, have negative but insignificant impacts on welfare participation. So do the marginal welfare tax rates on earned and unearned income. One possible explanation for the insignificance of time limits is they have not become binding as of the time of the study. Alternatively, some SFHFwC with very low incomes are badly in need of public assistance so that they would not consider banking the benefits. In other words, time limits might interact with incomes.

For participation in FSP, only the number of children under age 6 and earned income play significant roles. The marginal effect of the number of children under age 6 is 0.07. In other words, one more child under age 6 increases the probability of FSP participation by 7 percentage points. Higher earned income lowers the probability of FSP participation with an elasticity of -0.26. Other factors, such as race, education, welfare program characteristics like time limits and marginal welfare tax rates on earned and unearned income, have no statistically significant impact on the probability of FSP participation in 1999.

Bivariate probit results

A bivariate probit analysis was also conducted to examine determinants of participation in the programs while accounting for the likelihood that the two equations for FSP and welfare participation are not independent. Table 5.2 presents the 1999 estimation results for the bivariate probit model. The same variables play significant roles in determining participation in both programs. The bivariate probit estimates are only slightly different from those in the reduced-form probit model. For welfare participation, the bivariate probit model produces a slightly larger (and significant) southern residence estimate for the south, but smaller estimates for the earned income, unearned income and unemployment rate than the reduced-form model does. The difference are, however, small. For FSP participation, the bivariate probit model produces slightly smaller estimates for all the variables except the time limit variables. Although the differences are very small, the correlation coefficient 0.79 of the two equations in the bivariate probit model shows that participation in the two programs is indeed correlated and that

estimates of the bivariate probit model may be more efficient. However, a quick scan of t-ratios show that the efficiency gains from using a bivariate probit are minor.

Structural probit estimates

Table 5.3 shows the estimation results of the participation in FSP using a structural probit model. There are two specifications for this model. To test the endogeneity of welfare participation, specification 1 uses actual observed values of participation in welfare (i.e. 0 and 1) as an independent variable, specification 2 uses predicted values of PARTWEL as an independent variable, which were obtained in the previous reduced-form probit estimation. The parameter estimates from specification 1 are, thus, likely to suffer from bias, due to the endogeneity of welfare program participation to the decision to participate in Food Stamp Program. To illustrate, in specification 1, participation in welfare has significant and positive impact on FSP participation. The actual mean percentage point difference in FSP participation rates in 1999 is 0.60 between welfare participants and non-participants, with 0.91 for the former and 0.31 for the latter (See appendix 4). The predicted difference in the probability of FSP participation is 0.56 between welfare participants and nonparticipants based on model results from specification 1. Families on welfare are 56 percentage points more likely to participate in FSP than families off welfare. The number of children and income are the other two significant determinants from specification 1. The former has a marginal effect of 0.09, 0.02 higher than in the reduced-form probit model. The latter has an elasticity of -0.17 .

However, different from specification 1 (also different from the reduced-form probit and the bivariate probit model), in which welfare, education and young children are all important determinants of FSP participation, only welfare participation has a significant and positive impact on FSP participation in specification 2. Other variables have no significant effects. An interpretation is, because welfare is endogenous, it is likely to bias other coefficients. Once factors affecting welfare participation are controlled for through the predictions from specification 2, the effects of other factors on FSP participation disappear. In specification 2, the predicted difference in probability of FSP participation is 0.19 between welfare participants and non-participants. Welfare

families are 19 percentage points more likely to participate in FSP than non-welfare families controlling for other determinants of participation in both programs.

Major reasons for the difference in results between specification 1 and specification 2 include the following: First, welfare participants are almost surely eligible for FSP so that eligibility is partly explained by the welfare variable. Second, welfare participants may be better informed about FSP. Third, they are less likely to feel stigma related to receiving public assistance.

Overall, the reduced-form probit, bivariate probit and structural probit models give similar estimation results. Although there exists a significant correlation between the participation in the two programs, we do not gain much from using the bivariate probit model over use of the reduced-form probit model. Residing in the South has significant and negative impact on participation in welfare; but has no significant impact on participation in FSP in any of the three models. This finding is consistent with some others; for example, Coe (1983) and Capps & Kramer (1985) did not find significant effect from residing in South. One possible reason for difference of effects of southern residence on welfare and FSP participation is that welfare and FSP have different eligibility rules and processing procedures. FSP eligibility is set nationally, while welfare eligibility differs by state. Another possible reasons is that welfare benefits are much lower in the southern states than in the remaining states. FSP benefits are homogenous across south and non-south because FSP is a federal entitlement program. However, no clear interpretation can be presented since estimation for 1993 presented does not show the same results as for 1999.

Consistent with theory, the number of children under age 6 has a significant and positive impact on FSP participation because more children imply higher program benefits and/or less stigma from receiving assistance. Also, parents of young children may receive more information about FSP. Earned income has a significant and negative impact on both FSP and welfare participation, because families with higher incomes are more likely to be ineligible, to think they are ineligible for assistance, and/or are more likely to get bad feeling from receiving assistance.

Participation in welfare has a significant and positive impact on the probability of participation in FSP. Families on welfare are more likely to get more information on FSP

and be more aware of their eligibility for FSP. They are also surely eligible for FSP (But recall that we use 150 percent of poverty line as a rough approximation of eligibility). The reduction of welfare rolls may, in the future, reduce FSP participation rates. Other demographic characteristics such as age, race, education, number of children between age 6 and 17, and unearned income do not significantly impact the probability of participation in FSP. Finally, the local labor market situation has no significant impact on FSP participation, although the signs of their estimates are mostly consistent with theory or others' findings.

5.2.2 Results for 1993

Part of the purpose of this thesis is to investigate how program participation decisions have changed over time. For this reason, we present pre-reform results here. Following this, the differences across the years are compared.

Reduced-form probit results

Table 5.4 presents the estimation results of reduced-form probit for the participation in FSP and welfare in 1993. In the welfare participation model, an education level less than high school has a significant and positive impact. The predicted difference in probability of welfare participation is 0.16 between less-than-high-school degree owners and other degrees owners. The other two significant factors are earned income and unearned income. Both have negative impact on welfare participation. The elasticity is -0.27 with respect to earned income and -0.10 with respect to unearned income.

For FSP participation, more factors appear to play significant roles. Black families are 20.4 percentage points more likely to participate in FSP than white. Female heads with both lower-than-high-school or high school degrees are more likely to participate in FSP than some college or college degrees owners. The number of children under age 6 also has significant and positive impact on the probability of participation in FSP. However, either earned income or unearned income has a negative impact on FSP participation, with elasticity of -0.20 and -0.05, respectively. Residing in the South has negative impact on FSP participation, but this effect is not significant.

Bivariate probit results

Table 5.5 presents the estimation results of bivariate probit model for 1993. The difference in estimates between the bivariate probit and reduced-form probit is minor. The former seems to get smaller estimates for education, income and marginal welfare tax rate and larger estimates for age and number of children for FSP participation, and get smaller estimates for age, education, and number of children and larger estimates for black and Hispanic in the welfare participation model. However, the differences are all insignificant.

Structural probit estimates

Table 5.6 presents the estimation results of structural probit model of participation in FSP. Like the results for 1999, two specifications are also estimated in 1993. Specification 1 uses actual observed values of participation in welfare (i.e. 0 and 1). Specification 2 use predicted values of participation in welfare to capture the endogeneity of welfare.

In specification 1, the difference in probability of FSP participation is 0.50 between welfare participants and non-participants. Families who are on welfare are 50 percentage points more likely to participate in FSP. In addition to race, education and income, number of children under age 6 has positive impact on the probability of FSP participation. In specification 2, participation in welfare has a significant and positive impact on FSP participation. The actual FSP participation rate in 1993 was about 63 percent for welfare participants and about 37 percent for welfare non-participants. Families residing in the South are more likely to participate in FSP than the rest of US. The mean FSP participation rate was about 41 percent for non-metro south SFHFwC in 1993, and about 36 percent for their non-south counterparts. The older a female head is, the more likely its family participates in FSP. The elasticity with respect to age is 0.22; that is, 1 percent increase of age would increase the probability of participation by 0.002. Blacks were more likely to participate in FSP than whites. Other non-white has no significant impact on FSP participation compared to whites. Hispanics were more likely to participate in FSP than non-Hispanics. The estimation also shows that income has a significant and positive impact on FSP participation, which is hard to explain.

In sum, reduced-form probit, bivariate probit and structural probit analyses produce similar estimates of probability of participation in FSP and welfare for 1993. We seem not to gain much from the bivariate probit model other than from reduced-form probit. The statistically significant factors are race, education, income and participation in welfare. Some insignificant differences exist between models and specifications of same model analysis.

5.3 Comparing estimation results for 1993 and 1999

Comparison of the estimation results for 1999 and 1993 reveals that fewer factors appear to play significant roles in determining SFHFwC's probability of participation in FSP and welfare in 1999 compared to 1993, especially for FSP participation in each of the three models. For example, most of the demographic characteristics like age, education and race, have no significant impact on FSP participation in 1999, but these factors are important in 1993. One possible interpretation is that the economic environment of 1999 minimizes the effects of each of these. For example, female heads with low education levels are more likely to participate in both programs. However, in 1999, even less-educated people can get a job more easily than in 1993 due to the improved economy. This will decrease the probability of participation, thus counteracting the effect of lower education levels on the program participation. Another possible interpretation is that there is less variation in observed values of some variables in 1999 than in 1993, thus making their effects less outstanding. For example, the standard deviations of age, education and race are smaller in 1999 than their counterparts in 1993; that is, the sample is becoming more homogenous for these variables in 1999.

For both 1993 and 1999, income (earned/unearned or their sum) is the major factor affecting SFHFwC's participation in FSP and welfare. However, income seemed to be more important in determining SFHFwC's program participation in 1993 than in 1999. For example, in the reduced-form probit model, the elasticity with respect to earned income is -0.27 for welfare participation and -0.53 for FSP participation in 1993, but only -0.25 for welfare participation and -0.20 for FSP participation, respectively, in 1999. The elasticity with respect to unearned income is -0.10 for welfare participation and -0.13 for FSP participation in 1993, but only -0.05 for welfare participation and no significant

effect on FSP participation in 1999. A possible reason for the less responsiveness to income in 1999 is that many states increased the income limits for welfare eligibility (See Gallagher, 1998 for state income eligibility for a family of three with no unearned income). Also, people were supposedly more aware of their eligibility with certain income level in 1999 than 1993.

Unemployment rates had a significantly positive effect on the probability of participation in welfare in 1999 but no significant effect in 1993. Probably it is because PRWORA prescribed more restrictive rules on work requirements. Most states set their own rules in this regard on the basis of local labor market conditions. Unemployment rates had no significant impact on FSP participation in either year. This indicates that participation in FSP is less responsive to employment and local labor market conditions. A possible reason could be the difference in rules. For example, people are still eligible for FSP even when they become ineligible for welfare due to transition to work.

The predicted difference in probability of FSP participation between welfare participants and non-participants was 0.56 in 1999 and 0.50 in 1993. That is, welfare participation played a more significant role on FSP participation in 1999 than in 1993. Families on welfare are slightly more likely to participate in FSP in 1999, but the difference is not statistically significant. In other words, families off welfare are more likely not to participate in FSP in 1999 than in 1993. This could be viewed as an evidence of the hypothesis that leaving welfare may cause unnecessary FSP nonparticipation due to the welfare reform. The major reason for this is that TANF leavers are more likely to believe they are not eligible for FSP any longer.

5.4 Summary

This chapter presented the estimation results for the three types of probit models. The empirical analysis was conducted through comparison between models and across years. Comparison between the reduced-form probit and the bivariate probit model was purported to examine the differential efficiency. As is turned out, the bivariate probit model did not gain much efficiency over the reduced-form probit model. The structural probit model was used to examine the effect of welfare participation on FSP

participation. The next chapter will present the conclusions of this study and discuss some policy implications.

Table 5.1 Reduced form probit estimates of participation in FSP and welfare for 1999 (asy. t-ratios in parentheses, N=471)

Independent Variables	FSP	WELFARE
SOUTH	-0.0671 (-0.332)	-0.6976 (-2.872)*
LOGAGE	-0.3954 (-1.21)	-0.4170 (-1.143)
BLACK	0.3357 (1.456)	-0.0191 (-0.068)
NONWHITE	-0.0603 (-0.23)	0.0436 (0.157)
HISPANIC	0.0914 (0.417)	0.1476 (0.625)
LESSHIGH	0.2136 (0.863)	0.0387 (0.133)
HIGH	0.0922 (0.432)	-0.1367 (-0.541)
FOWNU17	0.0494 (0.742)	-0.0197 (-0.279)
FOWNU6	0.1883 (1.743)**	0.0671 (0.581)
TIME24	-0.1480 (-0.568)	-0.4584 (-1.249)
TIME48	0.2183 (1.014)	-0.2986 (-1.198)
T24OUT	0.1268 (0.536)	-0.0576 (-0.208)
MPEREARN	-0.0031 (-7.536)*	-0.0038 (-7.400)*
MPERUN	0.0003 (0.454)	-0.0026 (-3.107)*
UNEMPR	0.0186 (0.504)	0.1096 (2.627)*
UNEARN_R	0.7180 (1.286)	-1.0574 (-1.655)
EARN_R	-0.3361 (-1.223)	-0.4095 (-1.279)
CONSTANT	1.2453 (1.006)	1.8902 (1.366)
Log likelihood function	-270.1769	-203.0157

*. Significant at 5% level.

**. Significant at 10% level.

Table 5.2 Bivariate probit estimates of participation in FSP and welfare for 1999 (asy. t-ratios in parentheses, N=471)

Independent Variables	FSP	WELFARE
SOUTH	-0.0345 (-0.157)	-0.6682 (-2.516)*
LOGAGE	-0.3582 (-1.021)	-0.4083 (-1.039)
BLACK	0.3689 (1.535)	-0.0044 (-0.013)
NONWHITE	-0.0587 (-0.207)	0.0010 (0.003)
HISPANIC	0.1270 (0.546)	0.1197 (0.519)
LESSHIGH	0.2156 (0.781)	0.0427 (0.132)
HIGH	0.1057 (0.443)	-0.1164 (-0.399)
FOWNU17	0.0594 (0.835)	-0.0150 (-0.210)
FOWNU6	0.2104 (1.905)**	0.0589 (0.454)
TIME24	-0.1768 (-0.632)	-0.3986 (-0.842)
TIME48	0.1819 (0.837)	-0.2121 (-0.875)
T24OUT	0.1096 (0.455)	-0.0391 (-0.126)
MPEREARN	-0.0032 (-6.883)*	-0.0041 (-7.691)*
MPERUN	0.0003 (0.402)	-0.0028 (-3.267)*
UNEMPR	0.0216 (0.579)	0.0935 (2.209)*
UNEARN_R	0.7241 (1.254)	-0.7766 (-1.080)
EARN_R	-0.2803 (-0.954)	-0.3514 (-0.958)
CONSTANT	1.0170 (0.766)	1.7993 (1.228)
Disturbance Corr.	0.7892 (13.501)	0.7892 (13.501)
Log likelihood function	-426.0384	-426.0384

Table 5.3 Structural probit estimates of participation in FSP for 1999 (asy. t-ratios in parentheses, N=471)

Independent Variables	Specification 1	Specification 2
Predicted PARTWEL ^a		0.6807 (2.46)*
PARTWEL ^a	1.6611 (8.537)*	
SOUTH	0.0667 (0.380)	0.2347 (1.056)
LOGAGE	0.3140 (0.953)	0.3119 (0.987)
BLACK	0.3616 (1.559)	0.2898 (1.312)
NONWHITE	-0.0684 (-0.241)	-0.0416 (-0.161)
HISPANIC	0.0992 (0.441)	0.0557 (0.266)
LESSHIGH	0.2910 (1.156)	0.2329 (0.978)
HIGH	0.2415 (1.109)	0.2192 (1.051)
FOWNU17	0.0341 (0.480)	0.0264 (0.406)
FOWNU6	0.2256 (1.934)*	0.1483 (1.381)
INCOME	-0.0015 (-3.531)*	-0.0001 (-0.091)
UNEMPR	-0.0047 (-0.121)	-0.0377 (-0.821)
CONSTANT	-1.5858 (-1.299)	-0.7660 (-0.666)
Log likelihood function	-241.5796	-283.4488

a. Endogenous variable

Table 5.4 Reduced form probit estimates of participation in FSP and welfare for 1993 (asy. t-ratios in parentheses, N=692)

Independent Variables	FSP	WELFARE
SOUTH	-0.0298 (-0.173)	-0.2266 (-1.249)
LOGAGE	0.0374 (0.135)	-0.3503 (-1.218)
BLACK	0.5297 (1.957)**	0.0233 (0.083)
NONWHITE	0.0635 (0.281)	0.2506 (1.052)
HISPANIC	0.1399 (0.598)	-0.2060 (-0.899)
LESSHIGH	0.5781 (2.798)*	0.443 (1.860)**
HIGH	0.3392 (1.788)**	0.3295 (1.452)
FOWNU17	0.0002 (0.004)	-0.0558 (-0.974)
FOWNU6	0.1879 (2.051)*	0.1202 (1.398)
MPEREARN	-0.0040 (-10.145)*	-0.0057 (-10.675)*
MPERUN	-0.0020 (-3.526)*	-0.0044 (-6.560)*
UNEMPR	0.0202 (0.756)	0.039 (1.416)
UNEARN_R	0.4016 (0.707)	0.2996 (0.499)
CONSTANT	-0.2156 (-0.205)	1.0001 (0.912)
Log likelihood function	-369.469	-329.439

Table 5.5 Bivariate probit estimates of participation in FSP and welfare for 1993 (asy. t-ratios in parentheses, N=692)

Independent Variables	FSP	WELFARE
SOUTH	-0.0447 (-0.241)	-0.2165 (-1.148)
LOGAGE	0.0885 (0.302)	-0.3752 (-1.332)
BLACK	0.5376 (1.873)**	0.0456 (0.143)
NONWHITE	0.0401 (0.168)	0.2369 (0.837)
HISPANIC	0.1184 (0.498)	-0.1415 (-0.666)
LESSHIGH	0.5681 (2.655)*	0.4412 (1.614)
HIGH	0.3150 (1.601)	0.3214 (1.201)
FOWNU17	0.0121 (0.191)	-0.0598 (-0.951)
FOWNU6	0.2046 (2.024)*	0.1075 (1.249)
MPEREARN	-0.0040 (-9.702)*	-0.0058 (-9.539)*
MPERUN	-0.0022 (-3.847)*	-0.0043 (-6.962)*
UNEMPR	0.0202 (0.703)	0.0339 (1.206)
UNEARN_R	0.2479 (0.407)	0.2595 (0.414)
CONSTANT	-0.3043 (-0.273)	1.1586 (1.062)
Disturbance Corr.	0.7503 (16.786)	0.7503 (16.786)
Log likelihood function	-636.136	-636.136

Table 5.6 Structural probit estimates of participation in FSP for 1993 (asy. t-ratios in parentheses, N=692)

Independent Variables	Specification 1	Specification 2
Predicted PARTWEL ^a		1.504 (3.409)*
PARTWEL ^a	1.5855 (10.328)*	
SOUTH	-0.0082 (-0.056)	0.3202 (1.723)**
LOGAGE	0.4086 (1.341)	0.5668 (1.861)**
BLACK	0.6183 (2.113)*	0.4979 (1.862)**
NONWHITE	-0.0794 (-0.321)	-0.3149 (-1.244)
HISPANIC	0.2336 (0.905)	0.4496 (1.766)**
LESSHIGH	0.4995 (2.248)*	-0.0875 (-0.308)
HIGH	0.1996 (0.990)	-0.1566 (-0.680)
FOWNU17	0.042 (0.622)	0.084 (1.298)
FOWNU6	0.1842 (1.741)**	0.0074 (0.071)
INCOME	-0.0018 (-4.416)*	0.0046 (1.908)**
UNEMPR	0.0091 (0.311)	-0.0393 (-1.225)
CONSTANT	-1.9378 (-1.744)	-1.7496 (-1.600)
Log likelihood function	-311.714	-369.473

a. Endogenous variable

Chapter 6: Conclusions and Policy Implications

6.1 Estimation conclusions

This study was triggered by the high poverty rate among non-metro South SFHFwC and the dramatic drop of caseloads of FSP and welfare in recent years. The welfare reform initiated by PRWORA in 1996, which is intended to move welfare recipients into workforce, has changed rules of welfare program and is associated with sharp drop in caseloads. There is concern that FSP participation will drop even among eligible families as these families leave welfare. One goal of this study is to understand the new pattern of FSP and welfare participation among non-metro SFHFwC. Because the small sample of southern non-metro SFHFwC, we expanded the sample to include the non-south families. We also examined the effect of welfare on FSP participation. It is hypothesized this effect has been affected by the reform; leaving welfare has caused unnecessary nonparticipation in FSP. The consequence of this, needless to say, will do harm to those families who are still eligible for and in need of food stamp assistance.

Through empirical analysis of the SFHFwC's participation in FSP and welfare in 1993 and 1999, this study found that non-metro SFHFwC's pattern of participation in FSP and welfare has indeed changed in some ways after the welfare reform. Major findings include:

1. SFHFwC residing in the South are less likely to participate in welfare in 1999. This effect is not significant for FSP participation in 1999 and for either program in 1993.
2. Number of younger children (under age 6) and family income (earned and unearned) are the two major factors affecting SFHFwC's participation in FSP and welfare in both years. In addition, the local unemployment rate has a significant impact on welfare participation in 1999; race and education also have significant impacts on FSP participation in 1993.
3. Although consistent with the prediction of theory, the coefficients of unemployment rates in FSP participation model are positive, the coefficients of marginal welfare tax rates on earned and unearned

income in TANF participation model are negative; however, these effects are not significant.

4. Fewer factors appeared to be explaining SFHFwC's decision to participate in FSP in 1999 than in 1993. Changes in economic environment and convergence of some demographic characteristics may be the reasons.
5. Welfare recipient families are more likely to participate in FSP than welfare nonparticipants. Moreover, welfare participation played a more important role in the FSP participation decision in 1999 than in 1993. That is, SFHFwC on welfare were more likely to participate in FSP in 1999 than in 1993. Put conversely, SFHFwC leaving welfare are more likely not to participate in FSP in 1999 than in 1993.

6.2 Policy implications

Government policy should be aimed not only to reduce caseloads of FSP, but also to ensure food safety of the poor who are in real need of food stamp assistance. Improving the economic situation is the best way to achieve these goals, as income is the most significant factor affecting SFHFwC's participation in FSP in our models. The unemployment rate does not directly have a significant impact of FSP participation, but it has a significant impact on welfare participation, and through this effect, affects FSP participation. Employment and higher income may reduce or even eliminate families' need for assistance. However, policy makers should pay special attention to those working female heads when they are not making enough money to get their families out of need for food assistance. This group (the so-called working poor) is generally easier to ignore by policy makers.

Researchers have been worrying about the over-dramatic drop of FSP caseloads caused by leaving welfare caseloads in recent years. For example, the National Survey of American Families (NSAF) found that former welfare recipients left FSP at significantly higher rates than their non-welfare counterpart at all income levels (Zedlewski and Brauner, 1999). Our study indicates that SFHFwC's participation in welfare has a significant impact on their FSP participation, particularly after welfare reform. Policy

maker should pay attention to this link between the participation in the two programs. Welfare leavers need to be well informed their eligibility for FSP if it is true. Work also needs to be done to reduce or eliminate the confusion about the eligibility rules for the two programs.

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Appendix 1 Average monthly AFDC/TANF payment per recipient, fiscal years 1990 – 1996 and average monthly TANF payment per family, fiscal 1997 and 1998

	1990	1991	1992	1993	1994	1995	1996	1997	1998
Alabama	39.41	41.51	49.97	56.95	58.01	58.45	59.50	138.04	139.58
Arkansas	66.44	67.04	67.80	68.49	68.95	64.26	73.34	.	166.68
Florida	94.06	94.96	101.62	96.55	100.37	102.34	101.05	237.26	228.45
Georgia	91.09	91.59	90.27	90.40	90.63	90.26	90.86	239.02	236.82
Kentucky	85.09	79.12	77.39	77.84	79.44	80.31	91.23	221.70	219.64
Louisiana	55.66	56.25	55.35	56.10	56.53	50.14	46.01	152.12	159.13
Mississippi	40.29	41.31	41.72	42.15	42.91	43.40	43.80	104.94	101.15
North Carolina	92.01	92.92	89.14	87.98	88.32	88.97	89.84	219.86	219.56
South Carolina	71.91	71.21	71.19	67.07	68.66	69.19	70.53	155.27	157.60
Tennessee	66.24	68.00	64.43	58.91	59.80	59.96	60.76	171.94	169.91
Virginia	97.97	99.56	99.41	99.13	108.35	100.73	102.53	248.16	245.74
West Virginia	82.55	83.33	84.39	85.18	91.75	86.64	88.94	233.72	237.59

Source: Administration for Children and Families. <http://www.acf.dhhs.gov/programs/opre/director.htm>

Note: For 1997 and 1998, average monthly TANF payments per household are shown.

Appendix 2 State Time limits for TANF eligibility

State	Time limit	Code	State	Time limit	Code
Alabama	60 months	4	Montana	60	4
Alaska	60	4	Nebraska	24 out of 48 months	2
Arizona	60	4	Nevada	60	4
Arkansas	24	1	New Hampshire	60	4
California	60*	4	New Jersey	60	4
Colorado	60	4	New Mexico	36	2
Connecticut	21	1	New York	60***	4
Delaware	48	2	North Carolina	60	4
D. C.	60	4	North Dakota	60	4
Florida	48	2	Ohio	36	2
Georgia	48	2	Oklahoma	60	4
Hawaii	60	4	Oregon	24 out of 84 months	3
Idaho	24	1	Pennsylvania	60	4
Illinois	60	4	Rhode Island	60*	4
Indiana	60	4	South Carolina	60	4
Iowa	Individualized ^a	4	South Dakota	60	4
Kansas	60	4	Tennessee	60	4
Kentucky	60	4	Texas	60	4
Louisiana	24 out of 60 months	3	Utah	36	2
Maine	60	4	Vermont	None	4
Maryland	60**	4	Virginia	24; re-eligible after 2-3 years	1
Massachusetts	24 out of 60 months	3	Washington	60	4
Michigan	None	4	West Virginia	60	4
Minnesota	60	4	Wisconsin	60	4
Mississippi	60	4	Wyoming	60	4
Missouri	60	4			

Source: Gallagher, 1998

Note: a. The time limit is individualized based on what is specified in the Family Investment Agreement.

*. After family reaches the time limit, the adult portion of the benefit is eliminated but cash assistance is continued for the children in the unit.

**.. After family reaches the time limit, the adult portion of the benefit is eliminated but a voucher payment or payment to representative payee is made for the children in the unit.

***. After family reaches the time limit, a voucher or restricted third-party payment is made for the entire family.

Code: 1=TIME24, 2=TIME48, 3=T24OUT, 4 is omitted.

Appendix 3 Non-metro unemployment rates and welfare program marginal tax rates on earned/unearned income

State	Non-metro unemployment rate (%)		Welfare program marginal tax rate on unearned income (%)		Welfare program marginal tax rate on earned income (%)
	1999	1993	1999	1993	1999
Alabama	5.41	9.35	0.78	0.44	0.00
Alaska	9.09	10.48	0.53	0.56	0.67
Arizona	7.80	10.29	0.59	0.54	0.70
Arkansas	5.92	7.91	0.36	0.47	0.50
California	11.36	15.62	0.42	0.49	0.50
Colorado	3.76	7.25	0.47	0.47	0.67
Connecticut	3.59	6.97	0.49	0.50	0.00
Delaware	4.78	6.06	0.25	0.54	0.67
D. C.	.	.	0.55	0.56	0.67
Florida	5.04	7.32	0.37	0.53	0.50
Georgia	5.15	7.44	0.37	0.37	0.67
Hawaii	7.51	7.66	0.43	0.60	0.64
Idaho	6.91	8.88	0.45	0.53	0.60
Illinois	5.16	9.64	0.34	0.35	0.33
Indiana	3.50	7.33	0.52	0.52	0.67
Iowa	3.68	5.38	0.40	0.40	0.50
Kansas	3.77	5.11	0.54	0.56	0.60
Kentucky	5.96	8.26	0.40	0.29	0.00
Louisiana	7.17	9.51	0.16	0.46	1.00
Maine	5.28	10.07	0.41	0.44	0.50
Maryland	6.44	9.78	0.75	0.55	0.74
Massachusetts	3.93	8.44	0.54	0.54	0.50
Michigan	7.55	10.36	0.60	0.60	0.80
Minnesota	4.26	8.17	0.58	0.58	0.64
Mississippi	6.30	7.38	0.26	0.18	0.00

Missouri	3.95	9.02	0.52	0.52	0.67
Montana	6.76	7.85	0.56	0.46	0.75
Nebraska	2.89	3.04	0.54	0.54	0.80
Nevada	5.58	9.67	0.79	0.54	0.00
New Hampshire	3.06	7.69	0.50	0.58	0.50
New Jersey	.	.	0.50	0.54	0.00
New Mexico	8.73	10.07	0.54	0.56	0.50
New York	7.44	8.64	0.54	0.58	0.58
North Carolina	5.11	7.09	0.29	0.29	0.67
North Dakota	4.44	6.07	0.65	0.56	0.73
Ohio	5.64	8.84	0.37	0.37	0.50
Oklahoma	5.58	7.29	0.42	0.53	0.50
Oregon	9.06	11.02	0.74	0.74	0.50
Pennsylvania	6.85	9.59	0.50	0.56	0.50
Rhode Island	4.09	10.53	0.43	0.58	0.50
South Carolina	5.07	9.91	0.22	0.22	0.67
South Dakota	3.73	4.68	0.68	0.49	0.80
Tennessee	6.26	8.25	0.22	0.16	1.00
Texas	6.32	8.29	0.47	0.47	0.67
Utah	4.48	5.63	0.45	0.45	0.50
Vermont	3.93	6.82	0.64	0.63	0.75
Virginia	4.52	7.40	0.26	0.27	1.00
Washington	8.44	12.98	0.50	0.58	0.50
West Virginia	9.08	14.50	0.58	0.51	0.60
Wisconsin	5.27	7.31	0.49	0.70	1.00
Wyoming	5.76	6.71	0.63	0.36	1.00

Source: Calculated by Hazarika, 2000.

Appendix 4 Sample FSP and welfare participation rates for 1993 and 1999 (%)

1993						1999					
Welfare		FSP		FSP		Welfare		FSP		FSP	
South	Non-south	South	Non-south	Welfare recipients	Non-welfare recipient	South	Non-south	South	Non-south	Welfare recipients	Non-welfare recipient
35.9	41.1	61.0	56.8	93.4	35.9	15.2	27.0	44.2	45.3	91.0	30.8

Source: CPS 1993, 1999

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