Social Assistance Programs and Outcomes: Food Assistance in the Context of Welfare Reform

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Abstract

Food assistance programs play an important role in meeting the basic needs of low-income households. We consider the complex interactions among food stamps, labor force participation, and food insecurity status of low-income households under different program designs and economic conditions. The analysis uses data from the Survey of Program Dynamics to jointly estimate the role of participation in the Food Stamp Program (FSP), labor market participation and well-being, measured as food security, through the use of a simultaneous equation model. The results of our research suggest that food insecurity has a positive effect on FSP participation while labor force participation reduces FSP participation. Furthermore, FSP participation is more responsive to changes in the program benefits than to changes in nonlabor income. The linkages among food program participation, labor force participation, and well-being, measured in terms of food insecurity, are complex. The structural approach provides evidence that, among low-income households, program parameters affect FSP participation but no evidence that the food assistance reduces food insecurity.

Keywords: food assistance, food security, labor.

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Introduction

Major reforms in U.S. welfare policy introduced in 1996 shifted significant funding and responsibility for welfare assistance from the federal to the state level and include policies to encourage work and limit time on welfare. As a result of the reforms, the Food Stamp Program (FSP) has become the major federal safety-net program for low-income households. As evidence, families that left the welfare between 1997 and 2002 increased the use of food stamps (Loprest and Zedlewski, 2006). The FSP provides assistance to low income households to help them obtain a nutritionally adequate diet and avoid hunger, and for many low-income households, food stamp benefits represent an important share of household resources. Over 25 million people living in 11.2 million households participated in the FSP in 2005 (fiscal year). The average monthly benefit was $213 per household (USDA/FNS, 2006). In 2004, more than half of the FSP participants were children and most (63 percent) of the food stamp households with children were single-adult households. Forty-four percent of single-adult households with children had earned income (Poikolainen, 2005).

One of the major goals of the FSP is to reduce food insecurity and hunger. Although most households in the United States are food secure, in 2004 there were 13.5 million U.S. households (or 11.9% of all households) that were food insecure and one-third of these households (or 3.9 percent of all U.S. households) were food insecure to the extent that at least one member was hungry during the previous year because the household could not afford enough food (Nord et al., 2005). Food insecure households have “limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain availability to acquire acceptable foods in

socially acceptable ways" (Anderson, 1990; Nord et al., 2002). Faced with a new and challenging environment for social assistance, it is critical to understand the structure of simultaneous labor market and program participation choices in effecting improvements in well-being for low-income households. Our study evaluates the relationship among labor supply, food assistance (specifically the FSP), and food insecurity. Micro-level data from the Survey of Program Dynamics from the U.S. Census Bureau enables analysis of the simultaneous effect of socio-economic factors, program parameters, and labor market participation on food security at the household level.

The analysis considers the key programmatic and welfare questions of whether participation in the FSP alleviates food insecurity and, conversely, how food insecurity affects FSP participation. The ultimate objective of our research is to develop and use a model of the joint decisions by households to participate in the FSP and/or work, and the impacts of FSP and labor force participation on well-being as measured by food insecurity. The model is used to help to explain why some households that participate in the FSP find it difficult to sustain food security.

Our approach makes explicit the relationship among FSP participation, labor participation, and food insecurity by considering a simultaneous model of program participation, labor market participation and food insecurity to predict outcomes that are not independent of each other. We exploit the simultaneous model structure to account for the endogeneity of the jointly determined decisions and outcomes in order to evaluate whether households more likely to participate in the FSP are more likely to be food insecure. This study is similar to the studies by Gundersen and Oliveira, 2001 and Jensen, 2002 that each use a simultaneous equation model to account for endogeneity of FSP participation and food insufficiency (insecurity) of the households. However, we extend the model to include the labor force participation decisions of low-income

families. The structural model allows us to evaluate simulated effects of changes in policy parameters (food stamps benefit) and nonlabor income on FSP participation in order to interpret the results in light of alternative social assistance policies.

Previous studies

A number of earlier studies have examined the determinants of participation in the FSP among low-income or FSP-eligible households (see Gleason et al., 1998; Wilde, 2001; Currie, 2003). Among other important and related studies is one by Fraker and Moffitt 1988, which models the effect of participation in food stamps and welfare programs on labor supply. The authors estimate that in 1980 the FSP reduced labor supply of female heads of families by about 9%. A later study by Hagstrom 1996 finds that the FSP has a weak effect on the labor supply of married couples. One surprising finding is that many households do not participate in the FSP, or leave the FSP, even though they are eligible to participate (Zedlewski and Brumer, 1999; Wilde et al., 2000).

In the last decade, substantial work on the measurement of hunger and food insecurity has been accomplished (e.g., Anderson, 1990; Frongillo, 1999; Hamilton et al., 1999; National Research Council, 2005). However, predicting the relationship between program participation and food insecurity shows mixed results. Gundersen and Oliveira (2001) use a simultaneous equation model with two probits and show that food stamp participation has no effect on food insufficiency. Jensen (2002) finds a positive correlation between food stamp participation and food insecurity. Borjas (2001) examines the effects of public assistance on food insecurity and finds that immigrants adversely affected by the welfare reform legislation are more likely to experience an increase in food insecurity. Other research shows that food insecurity is related to

socio-demographic and economic conditions that limit the household resources available for food acquisition (Rose et al., 1998; Olson et al., 1996). Variables found to be significantly related to food insecurity include adverse health conditions, low income, minority status, low education, and food assistance program participation.

Data and Descriptive Results

The Survey of Program Dynamics (SPD) is an annual survey, beginning in 1997, of households that had been interviewed periodically during several earlier years in the Survey of Income and Program Participation (SIPP).[1] The SPD was designed specifically to monitor and assess outcomes of welfare program changes begun in 1996. It includes questions on a broad array of topics, including income, employment, use of food and nutrition assistance programs, and receipt of cash welfare. Beginning in 1998, the SPD included the Household Food Security Survey Module, a module that includes questions designed to measure food insecurity using questions representing a continuum of food-related behaviors and experiences.

For the empirical analysis, the first SPD longitudinal data and the 1998 SPD experimental data files are used.[2] The SPD contains detailed information about the characteristics of and the choices made by participant and non-participant households. The longitudinal SPD file provides information on income, job participation, program participation, health insurance and utilization, and the well-being of adults and children during the reference period (1997). Because the longitudinal SPD lacks data on assets, the asset information from the 1998 SPD experimental file is merged with the SPD longitudinal file. The 1998 SPD experimental data were minimally edited, and imputations were not performed for missing data.

The SPD 1998 Food Security Status File is intended to measure the experience of food insecurity and hunger and contains summary food security status information for the households. The food security status variables, available in the file, were based on the 18 core items in the food security module. The 18 questions are used to create a scale to categorize and describe the severity of food insecurity in a household. The food security status yields a categorical measure of food security status identifies households as food secure, food insecure without hunger, or food insecure with hunger. In our analysis we group the households as (1) food insecure; and (2) food secure households. Information on the state's annual unemployment rate is also included.

Only unmarried households with female head (ages 18 through 59) are included in the sample used in our analysis. Households with income 300 percent of the poverty level and higher and with assets of $5,000 and higher are excluded in order to include only households that may potentially be eligible for the FSP (the asset limit for the FSP is $2,000; and $3,000 for households with elderly members). The resulting sample includes 1,368 unmarried female households with low wealth and low income; 89% have one or more children (estimate based on weighted data[3]). Table 1 presents the definitions, means and standard errors of the sample (weighted) percentage data. In the sample analyzed, 37% of the households participate in the FSP, 76% are in the labor force, and 34% are food insecure households. Twelve percent of the households have a disabled member.

Participation in the labor force and FSP differ across the eligible households. Households are aggregated into categories according to characteristics that are exogenous to (determinants of) their responses to changing program and employment opportunities. They are classified into four groups on the basis of work and FSP participant status: (1) working, food stamp participant; (2)

not working, not food stamp participant; (3) not working, food stamp participant; and (4) working, not food stamp participant.

Table 2 summarizes the main descriptive characteristics of the four groups. The first row of the table gives the demographic characteristics of the whole sample. Those who work and do not participate in the FSP ($L=1$, $P_f=0$) are more likely to be white and have more years of education. The FSP participants who do not work ($P_f=1$, $L=0$) are more likely to have more children, have fewer years of education, and have the smallest amount of nonlabor income. Figure 1 presents the food security status of the four different household groups. FSP participants who are not working are the most vulnerable group, with 54% being food insecure and 21% being food insecure with hunger. Only 24% of the working non FSP participants are food insecure households and 8% are food insecure with hunger. On average (results not presented in Figure 1), food stamp participants have higher food insecurity rates (including food insecure with hunger) than do eligible nonparticipants. Forty eight percent of the FSP participants are food insecure and 26 % of the eligible FSP nonparticipants are food insecure.

The Econometric Model and Estimation Strategies

A four-equation structural model allows us to examine feedback among endogenous variables. The food stamp, food insecurity, and labor supply decisions are interdependent because labor supply decisions depend on the food stamp benefits (through their effect on the budget constraint), and the food stamp participation decision depends on the labor supply decision (through its effect on the food stamp benefits). Each FSP payment is reduced by 24¢ to 36¢ for every additional dollar of earnings (Center on Budget and Policy Priorities, 2001). Food security is one of the identified outcomes of the FSP, and we would expect the program to reduce

food insecurity. At the same time, food insecure households are likely to seek participation in the FSP. Because of these interactions, program participation and labor supply must be estimated jointly with the food insecurity outcomes.

The relationships among the choices are complex and difficult to determine because of the endogenous nature of labor force participation, FSP participation, and food insecurity. Participation in the FSP is not likely to be independent of the consumption decisions that reduce food insecurity. Other variables may influence both FSP participation and food insecurity status and may conceal the causal effect of food stamps. The possibility that households that are more likely to participate in the FSP are also more likely to be food insecure is the reason that food insecurity status should be modeled as endogenous. The disturbance term captures the unobserved influences.

The potential for contemporaneous decisions on employment, participation in the FSP, and for being food insecure is taken into account by using a simultaneous equation framework. The econometric model is a four-equation structural model, with the endogenous variables labor force participation (L), FSP participation (P_f), food insecurity (P_h), which are probit and the wage, which is continuous variable. The empirical specification of the structural model is as follow:

(1) $L^* = \beta_{lh}P_h + \beta_{lf}P_f + \boldsymbol{\beta_l Z_l} + \mu_l$ with L = 1 if $L^* > 0$, and 0 otherwise

(2) $P_f^* = \beta_{fl}L + \beta_{fh}P_h + \boldsymbol{\beta_f Z_f} + \mu_f$ with $P_f = 1$ if $P_f^* > 0$ and 0 otherwise

(3) $P_h^* = \beta_{hl}L + \beta_{hf}P_f + \boldsymbol{\beta_h Z_h} + \mu_h$ with $P_h = 1$ if $P_h^* > 0$ and 0 otherwise

Although L^*, P_f^*, and P_h^* are unobservable, we do observe L (as response equal to 1 if the household head participates in the labor market and 0 otherwise), P_f (as response equal to 1 if the household participates in the FSP and 0 otherwise) and P_h (as response equal to 1 if the

household is food insecure and 0 otherwise). Define $\mathbf{Z}$ as a vector that includes all observed exogenous variables and $\mathbf{Z_l} \subset \mathbf{Z}$, $\mathbf{Z_f} \subset \mathbf{Z}$, $\mathbf{Z_h} \subset \mathbf{Z}$ and $\mathbf{Z_l} \neq \mathbf{Z_f} \neq \mathbf{Z_h}$; β_{lh}, β_{lf}, $\boldsymbol{\beta_l}$, β_{fl}, β_{fh}, $\boldsymbol{\beta_f}$, β_{hl}, β_{hf}, and $\boldsymbol{\beta_h}$ are parameters; and μ_l, μ_f, and μ_h are disturbance terms. Bold indicates a vector.

The individual's human capital–based wage equation is

$$\ln(\text{wage}) = \beta_0 + \beta_1 \text{age} + \beta_2 \text{agesq} + \beta_3 \text{edu} + \boldsymbol{\beta_4} \mathbf{Z_w} + \mu_w, \quad (4)$$

where $\mathbf{Z_w}$ is a vector of exogenous variables including race and labor market variables (state unemployment rate); β_0-$\boldsymbol{\beta_4}$ are parameters to be estimated; and μ_w is a normal random error term. The wage equation also includes a labor-market selection variable. The wage is included in the labor force and FSP participation equations as a determinant of the decision to participate in the labor market and the FSP. The predicted wage is included in the FSP participation equation because it affects the time costs of applying for food stamps and may affect permanent income as well. However, the inclusion of the wage in the two equations introduces an additional endogeneity problem. To deal with this issue, we estimate the wage equation by ordinary least squares and use the individual's human capital, demographic variables, and other factors as regressors (eq. 4).[4] Predicted wage rates are used to instrument the wage in the model.

The structural hypothesis is that labor supply depends on FSP participation and food insecurity, FSP participation depends on labor supply and food insecurity, and food insecurity depends on labor supply and FSP participation. We chose to estimate the equations by the instrumental-variables method proposed by Mallar (1977).[5] The advantage of the structural approach used, where underlying utility parameters are estimated, is the ability to conduct out-of-sample simulations of food security and FSP participation with policy and economic changes. This feature is missing from more commonly adopted reduced-form models. However, the challenge with the structural approach is that identification of the underlying structure is

oftentimes much more difficult (Wilde and Nord, 2005). To identify the structural model, we use several exclusion restrictions, described next.

One factor of the FSP that is likely to have a direct influence on participation is the policies on the length of the certification period; in general longer recertification intervals are associated with less frequent administrative requirements to retain benefits. We define a variable called RECERT as the state average time to FSP recertification in months. The data used to construct this variable was obtained from Rangarajan, Castner and Clark (2005, Table B.2, p. B.5). The RECERT variable is excluded from the labor force participation and the food insecurity equations. The state income tax for low income households' variable is included only in the labor participation equation (Council of State Governments, 1998).

To identify the food insecurity equation, a dichotomous variable equal to 1 if the state winter (Dec-Feb) 1998 temperature was above the normal is constructed.[6] These data were obtained from the National Oceanic and Atmospheric Administration. The variables "education" and "white" are included in the wage equation but excluded from the structural FSP, labor force participation, and food insecurity equations.

We have included dichotomous variables for children in the household, including number of children age 6 and under, between 6 and 13 years of age, and between 13 and 17 years of age; a variable for nonlabor income, and variable indicating disability status. These variables are included in our model because they are expected to have a significant effect on the labor force participation decision as shown in other labor literature (Fraker and Moffitt, 1988; Hagstrom, 1996; Hoynes, 1996). The FSP benefits are also included in the model since the benefits are expected to have a positive effect on FSP participation and a negative effect on labor

participation and food insecurity. The FSP benefit (G) is defined as the maximum FSP grant per month in dollars to household (based on household size) given participation.

Empirical Results

The dependent variables of the empirical model are FSP participation, food insecurity, labor force participation, and *ln* hourly wage. The simultaneous equation model is estimated using an instrumental variable estimator. First, two sets of estimates were generated for the wage equation, one with a selection term and one without a selection term. The results are reported in Table 3. A joint test of all the nonintercept coefficients being zero, except for the coefficient of the selection term, is rejected. The sample value of the F statistics is 6.37 (the critical value is 2.01). The estimated wage equation shows that wage is a nonlinear function of age and the age effect on wage peaks at age 47. The findings on other coefficients are consistent with previous studies (Keane and Moffitt, 1998; Fraker and Moffitt, 1988; Hoynes, 1996). One additional year of schooling has the direct effect of increasing the wage by 6.2%. Added schooling increases wage income through increased labor productivity, holding other factors equal. Being white also increases an individual's wage, although the coefficient is not statistically significant.

The structural estimates of FSP participation, food insecurity, and labor force participation are presented in Table 4. In the FSP equation most of the estimated coefficients are statistically significant. Being in the labor force decreases the probability of participating in the FSP, and the effect is statistically significant. Households that are food insecure are more likely to participate in the FSP. Program parameters have an effect on participation. The higher is the food stamp benefit (G), the higher is the probability of a household being in the FSP. The coefficient of the recertification variable is positive and statistically significant. The longer the FSP recertification

period is more likely is the household to participate in the program. Also, being older, having higher nonlabor income and a higher (predicted) wage make the household less likely to participate in the FSP and the effects are significant.

Being in the labor force decreases the probability of being food insecure but the effect is not statistically significant. FSP participation is associated with increased likelihood of being food insecure, although again, the effect is not statistically significant ($p = 0.11$). Neither is the effect of the level of the FSP benefit (G) on food insecurity. Having children age between ages 13 and 18 increases the probability of being food insecure household and the effect is significant. The effect of the state winter temperature on food insecurity is negative and statistically significant, which is consistent with the previous study (Bhattacharya et al., 2002). The warmer winter temperatures (or above the normal) decrease the probability of being food insecure household, and suggest households are able to divert resources from expected heating costs to other household needs, including food.

Being a food insecure household or participating in the FSP decreases the probability of labor force participation although the effects are not statistically significant. As expected, the choice of working is positively related to a higher (predicted) wage. Other determinants of the choice of working include age, having young children, being disabled, and living in a state with a higher unemployment rate, all effects which lower the probability of working.

The results from the jointly estimated equations allow us to simulate the effects of changes in policy parameters (food stamps benefit) and nonlabor income on FSP participation.[7] The simulations are constructed by using the structural model estimates to predict the probabilities of FSP participation given the household variables (demographic characteristics, nonlabor income, and food stamps benefit). The predicted probabilities for each observation are then used to

calculate mean probabilities over all observations. Varying the FSP benefit parameter allows us to compare the resulting probabilities of FSP participation to those experienced under the current law.

The baseline estimates for the simulations is the predicted rate of 34.6 percent of qualifying households that participate in the FSP. If eligible households received an increase of $100 in the monthly food stamps benefit (an increase of 29% in the average benefit level), the change in the food stamps benefit would increase the probability of FSP participation by 8.32% compared to the baseline. In comparison, Hagstrom (1996) found that a 25% increase in the FSP benefit would increase food stamp participation by 7% for married couples. If, instead, eligible households were to receive an increase of $100 in the form of nonlabor income, this change would have a relatively small effect on the probability of FSP participation and decrease the probability of FSP participation by 0.91%. By comparing the effects of the $100 received either as an increase in FSP benefits or in the form of nonlabor income, we show that FSP participation for the single, female heads of households is more responsive to changes in the program benefits than to changes in nonlabor income.

Summary and Conclusions

As a result of reforms to the federal welfare system, the Food Stamp Program (FSP) has become the major federal safety-net program for low-income households. The FSP is designed to provide assistance to low income households to help them obtain a nutritionally adequate diet and avoid hunger. This study explores the effects of household characteristics and program parameters on labor force and FSP participation choices, and on food insecurity status. The knowledge and information gained from the analysis provide insights on possible interventions

that would support an unmarried female-headed households gain financial independence and self-sufficiency. The results also provide information on economic, programmatic, and non-programmatic factors that affect the well-being of low-income families, information which could be used for better program design. Rates of participation in the FSP differ across eligible households. Our analysis of the data shows that 35% of the potentially eligible, unmarried female households participate in FSP. The factors that determine FSP participation are family structure and the food stamp benefit level, as well as the labor market opportunities measured through the predicted wage.

The analytic results of the model on joint FSP participation, labor force participation, and food insecurity are consistent with our expectations. Higher food stamp benefits increase the probability that a household participates in the FSP. Unmarried females with younger children are less likely to be in the labor force. The predicted wage has a positive effect on work effort. And, we found a negative relation between FSP participation and labor force participation. Being food insecure increases the probability that a household participates in the FSP. Unmarried females with older children are more likely to experience food insecurity.

An important finding is that an increase in food stamp benefits increases FSP participation. This result implies that FSP participation among low-income and low-asset unmarried female households that are potentially eligible for the FSP is sensitive to changes in program parameters (e.g., food stamp benefit). Furthermore, FSP participation is also more responsive to changes in the program benefits than to changes in nonlabor income.

There was less support for identifying the role of economic and programmatic factors on improving household wellbeing, measured as food insecurity. Neither participation in the FSP nor the size of the FSP benefit reduced the probability of the household's being food insecure,

although both estimated coefficients were positive. The results are tempered by finding that food insecure households opt into the FSP. Estimating a structural models poses significant challenges but allows us to take account fully the complex linkages among food program participation, labor force participation, and well-being, measured in terms of food insecurity and to evaluate the relative magnitudes of possible interventions and programmatic changes.

Notes

1. The SPD observations are drawn from a complex three-stage sample design. For discussion of this see U.S. Census Bureau. To account for this, the standard errors are corrected for the complex survey design.
2. The first SPD longitudinal file is a fully edited file that provides demographic, economic and social characteristics data for calendar years 1992-1997, except for 1995. We used the 1997 SPD longitudinal data. The 1998 SPD experimental file is an unedited file that provides socio-economic data for 1997. Since the first SPD longitudinal file does not contain information on household assets, we use the asset information from the 1998 SPD experimental file.
3. Weights are available for the longitudinal data and are only representative for the people in the original sample in 1992-93. Using the weights allows the results to be generalized to the 1992-93 noninstitutionalized resident population. The SPD sample does not reflect changes in the U.S. population between 1992-93 and 1997 because of immigration or emigration. Weights were used in the descriptive results but not in the multivariate analysis.
4. We estimated a wage equation for the working household heads. The predicted wage is used in the labor force participation and the FSP participation equations in place of the actual wage as an instrumental variable.
5. The estimation method is similar to the two-stage least squares method and its procedures are as follows. In the first stage, each endogenous variable is regressed on a set of instrumental variables consisting of all exogenous variables in the structural model. In the second stage, predicted values of endogenous variables are the instruments for L, P_f, and

P_h, and these instruments are treated as fixed regressors and the resulting equations as single-equation models. These predicted values are the predicted latent values, $\mathbf{Z}'\hat{\beta}$ rather then the predicted probabilities. We then estimate the structural parameters with maximum likelihood applied to each equation separately.

6. The study by Bhattacharya et al. (2002) finds that poor families spend and eat less food during cold weather temperatures.
7. The coefficients of the food stamp benefit (G) and the nonlabor income variables are only statistically significant in the FSP participation equation in the structural model; therefore we simulated only their effects on FSP participation.

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Table 1. Definitions of variables, means and standard errors (n=1,368, weighted data)

Variable	Mean (Standard Error)	Definition
Age	36.54 (0.31)	Age of householder
Schooling	11.86 (0.06)	Years of schooling of householder
White	0.61 (0.02)	Dichotomous variable equal to 1 if householder is white, and 0 otherwise
Disabled	0.12 (0.01)	Dichotomous variable equal to 1 if household has a disabled member, and 0 otherwise
Citizen	0.94 (0.006)	Dichotomous variable equal to 1 if the householder is a US citizen, and 0 otherwise
Kids6	0.43 (0.016)	Dichotomous variable equal to 1 if the household has one or more children who are younger than 6 years old, and 0 otherwise
Kids13	0.53 (0.016)	Dichotomous variable equal to 1 if the household has one or more children who are between age 6 and 12, and 0 otherwise
Kids18	0.34 (0.014)	Dichotomous variable equal to 1 if the household has one or more children who are between 13 and 17 years old, and 0 otherwise
Northeast	0.21 (0.01)	Dichotomous variable equal to 1 if household lives in the Northeast region, and 0 otherwise
Midwest	0.22 (0.01)	Dichotomous variable equal to 1 if household lives in the Midwest region, and 0 otherwise
South	0.41 (0.01)	Dichotomous variable equal to 1 if household lives in the South region, and 0 otherwise
UNRATE	5.00 (0.03)	Annual state unemployment rate
Non labor income	1,428.38 (89.42)	Household non labor income exclusive of welfare transfers per year in $
G	344.43 (3.42)	Maximum FSP grant per month in $, given participation
Ln(wage)	1.96 (0.026)	Natural log of hourly wage
RECERT	7.94 (0.094)	State average time to FSP recertification (in months)
Temperature	0.48 (0.016)	Dichotomous variable equal to 1 if the winter (Dec-Feb) 1998 state temperature is above the normal
Inctax	2.27 (0.05)	State individual low income tax rate (in percent)
LF participation	0.757 (0.013)	Dichotomous variable equal to 1 if householder works, and 0 otherwise
FSP participation	0.373 (0.015)	Dichotomous variable equal to 1 if household participates in FSP, and 0 otherwise
Food Insecurity	0.343 (0.015)	Dichotomous variable equal to 1 if the household is food insecure, and 0 otherwise

Table 2. Main demographic characteristics of different household groups (weighted data)

Households number (unweighted)		Education	White	Children	Age	Nonlabor Income
Sample	1368	11.9	61%	1.8	36.5	$1428
FSP and labor force participant (P_f=L=1)	269	11.8	49%	2.1	33.3	$ 792
Not FSP or labor force participant (P_f=L=0)	117	11.4	62%	1.5	39.4	$2099
FSP participant; not labor force participant (P_f=1,L=0)	218	10.6	55%	2.4	37.0	$ 624
Labor force participant; not FSP participant (L=1,P_f=0)	764	12.3	67%	1.6	37.2	$1818
FSP participant (P_f=1)	487	11.3	52%	2.2	35.0	$ 717
Not FSP participant (P_f=0)	881	12.2	66%	1.5	37.5	$1852

Note: P_f=1 if the household participate in FSP and P_f=0 otherwise; L=1 if the householder works and L=0 otherwise.

Table 3. Estimates of the Individual Log Wage Equation

Explanatory Variables	Ln(wage)	ln(wage)
Intercept	0.383 (0.504)	0.416 (0.376)
Age	0.047 (0.019)**	0.047 (0.017)**
Agesq	-0.001 (0.0003)*	-0.001 (0.0002)**
Schooling	0.062 (0.020)***	0.061 (0.013)***
White	0.060 (0.050)	0.058 (0.050)
UNRATE	-0.045 (0.027)	-0.043 (0.024)*
Lambda	0.021 (0.205)	
R-square	0.05	0.05
F Statistics	7.89	9.46
Number of observations	975	975

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

Table 4. Structural Estimates of the Probabilities of FSP Participation, Food Insecurity and Labor Force Participation. *Bootstrap standard errors are in parentheses*

Explanatory Variable	FSP participation	Food Insecurity	Labor force participation
Intercept	1.712 (0.800)**	-0.649 (0.649)**	-1.187 (1.110)
Food Insecurity	0.365 (0.218)*		-0.092 (0.354)
Labor force participation	-0.387 (0.098)***	-0.082 (0.119)	
FSP participation		0.331 (0.209)	-0.124 (0.310)
Age	-0.021 (0.005)***	0.009 (0.006)	-0.019 (0.006)***
Kid6		-0.090 (0.092)	-0.230 (0.122)*
Kid18		0.166 (0.082)**	0.060 (0.112)
G	0.001 (0.0004)**	0.0005 (0.0004)	0.000 (0.0006)
Uempr	-0.056 (0.043)		-0.113 (0.048)**
Prwage	-0.607 (0.383)*		1.853 (0.531)***
Nlabinc	-0.0001 (0.00002)***	-2.5e-06 (0.00002)	-0.00003 (0.00003)
Citizen	0.113 (0.185)		
Disabled			-1.444 (0.244)***
Recert	0.033 (0.013)**		
Tempr		-0.134 (0.072)*	
Inctax			-0.043 (0.031)
Log Likelihood	-772.58	-852.68	-593.90
Number of observations	1368	1368	1368

Note: * Statistically significant at the 10 % level;
** Statistically significant at the 5 % level;
*** Statistically significant at the 1 % level.

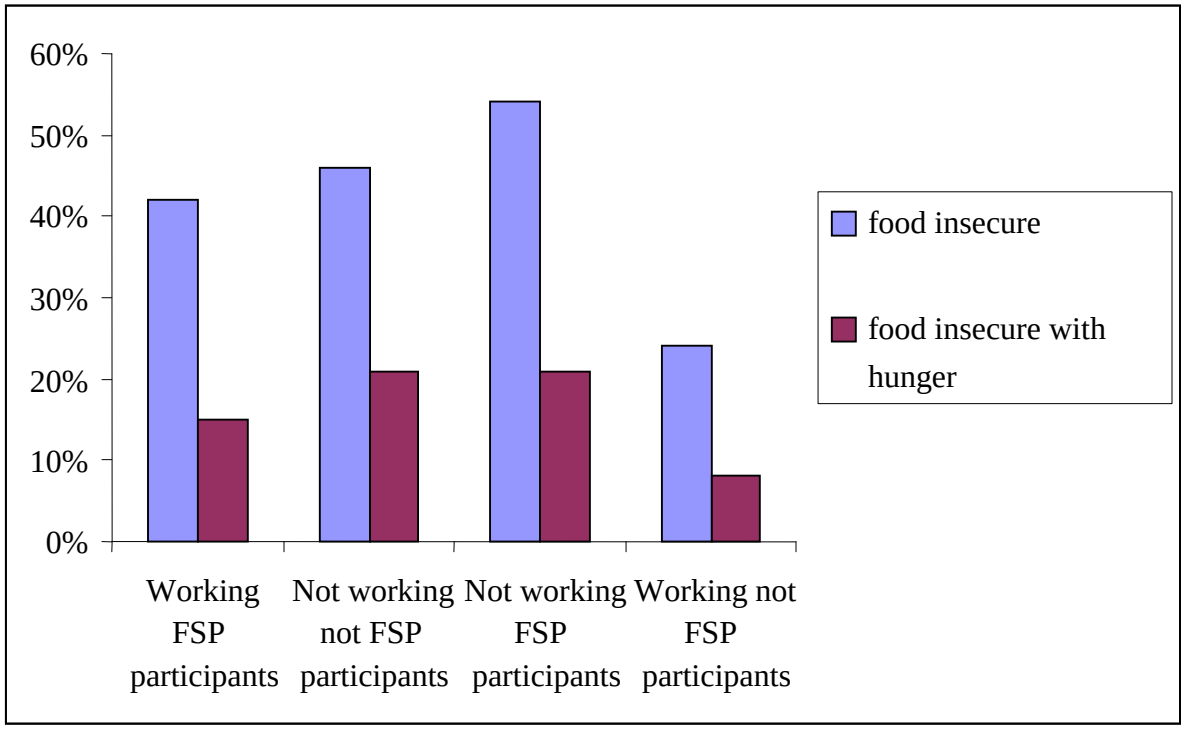

Figure 1. Food security status of the different household groups.
Note: Food insecure includes food insecure without hunger and food insecure with hunger households.