Labor-force dynamics and the Food Stamp Program:

Utility, needs, and resources

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Abstract: Existing literature has closely analyzed the relationship between welfare programs and labor-force participation. However, many have neglected to consider the Food Stamp Program (now referred to as Supplemental Nutrition Assistance Program). This paper will consider food as a necessary and often limited resource for working poor households. The study will focus on how Food Stamp Program participation affects household labor-force decision making as well as employment status, while controlling for economic and demographic factors.

I. Introduction

From its introduction in 1939, the Food Stamp Program (FSP) has provided substantial nourishment for low income families. This nourishment is arguably influential in a household's ability to maintain stable employment. Much like a firm's production requires resources like labor and capital, a severely low income family requires basic necessities and some comforts in order to be able to enter the labor-force. By estimating the effects of Food Stamp Program participation on poor households' employment decisions, it will be possible to see if this program is indeed providing resources to needy families or instead discouraging work. The paper will begin with background on the Food Stamp Program and then discuss relevant literature. From there, theoretical framework will be introduced and the study population will be defined. Empirical estimation will follow along with results and conclusions for policy.

II. Background on the Food Stamp Program

According to the USDA's Food and Nutrition Service (FNS), the Food Stamp Program helps about 26 million people every month purchase food they need for proper health. In total, congress spends around $17 billion on the program annually (Center on Budget and Policy Priorities [CBPP], 2001). The average monthly benefit for households was $213. About half of the total Food Stamp Program participants are children, mostly from single-parent households. Nearly two-thirds of eligible households participate, but this statistic varies greatly from state to state due to economic, demographic, and political factors (U.S. Department of Agriculture [USDA], 2005).

In order to be eligible for Food Stamp Participation, a household's gross income must be lower than 130 percent of the poverty line. For a family of four, this is $1,848 dollars a month. A household also must meet an asset test of $2,000 ($3,000 for households with at least one elderly member), but states are allowed to exempt the fair market value of the household's vehicle from their assets.

Once enrolled, the program requires all adult recipients to enter employment training or employment unless they are elderly, disabled, caring for a child under six, or some other reason. States are given the authority to decide how to enforce the employment regulations and they often focus most of their resources on Temporary Assistance for Needy Families (TANF), since many on Food Stamps are already working. States also have broad discretion on various program rules and joint participation with TANF (CBPP, 2001).

Recently, Food Stamp Program participation has increased among those who are eligible after years of decline following large scale welfare reforms and sustained economic growth. Between 1999 and 2002, the participation rate fell by about 4 percentage points to 54 percent. Shortly after, rates increased each year from 2002 onward, gaining nearly eleven percentage points to a rate of 65 percent in 2005 (USDA, 2005).

Decreases in Food Stamp Program participation during the mid to late 1990's can be attributed to a number of determinants. Economic growth and decreasing unemployment made low-income employment opportunities more readily available. Non-economic factors also played a role in the overall decline in participation. The Personal Responsibility and Work Opportunity Reconciliation Act of 1996 (PRWORA)

significantly limited the eligibility of noncitizens as well as Able-Bodied Adults Without Dependents (ADAWD). Many social programs shifted their goals toward returning those who could work to the labor-force and containing fraudulent activities, specifically with the advent of fingerprint analysis in Food Stamp eligibility requirements.

The first few years of the new millennium brought increased participation in the Food Stamp Program. Initially, the recession of 2001-2002 increased the need for public assistance programs like food stamps. Later, new outreach programs, simplified reporting standards, longer recertification periods, Temporary Assistance to Needy Families (TANF) categorical eligibility, vehicle asset exemptions, and widespread usage of the electronic benefits transfer program (EBT) helped continue the increased program enrollment (USDA, 2005).

III. Review of Existing Literature

Many studies have estimated the determinants of Food Stamp Program participation (ie see Young (2008), Schirm et al. (2007), Ratcliffe, McKernan, & Finegold (2007), and Hanratty (2006)). The majority of significant results were found using a large income boundary due to possible mobility between income levels and changes in eligibility requirements. Ratcliffe, McKernan, and Finegold (2007) find that longer recertification periods were positively correlated with the probability of enrolling in the Food Stamp Program. Similar to the other studies, expanded categorical eligibility was also positively associated with food stamp participation. Most severe TANF sanctions are negatively related to the probability of enrollment as well as use of biometric technology. In the other policy category, higher minimum wages both for Fair

Labor Standards Act (FLSA) and non FLSA employment are inversely correlated with the probability of accepting Food Stamps.

This study, however, is interested on the effects of Food Stamp Program participation on labor-force participation. There is a body of literature that analyzes the effects of demographics, public policy, and welfare programs on employment and labor-force participation. Eissa and Liebman (1996) find that single unmarried women's labor-force participation rates decreased with any unearned income including the welfare program Aid to Families with Dependent Children (AFDC). However, the authors find that the Earned Income Tax Credit (EITC) and other decreases in taxes for female headed households with children increased the probability of participation by 1.9 percentage points. Overall, the unmarried female labor-force participation rates over the years 1987-1991.

Eissa and Liebman (1996) also estimate the effects of AFDC and EITC on annual working hours. The authors find no significant reduction in number of hours worked for EITC-eligible unmarried female headed households. Their potential explanations for EITC's effects on labor-force participation but not on hours worked include a lack of knowledge of eligibility by already employed single women, difficulty in measuring the true annual number of hours worked (and its lack of variability), and some other unmeasured exogenous shock.

Hagstrom (1996) considers labor-force participation a joint decision-making process for two headed households. Using a nested model simulation, the author finds that a 25 percent Food Stamp benefits reduction leads to about a 30 percent increase in the wife's labor-force participation. For the husband, a 25 percent decrease in benefits

leads to minor increases in full time employment as well as a 1 percent decrease in the proportion of non working. For enrolled Food Stamp households only, the proportion of husbands not working decreases by 3.4 percent and increases their earned income by $650 per year.

Keane and Moffitt (1998) find that women who are older, have higher levels of education, are in good health, and are white have higher labor-force participation probabilities and lower welfare enrollment probabilities. They also find that having children decreases the probability of working. The authors also find a small negative and signification relationship between labor-force participation probability and the state unemployment rate. Reductions in tax rates on benefits have a marginally small effect on labor-force participation while wage subsidies increase labor-force participation and decrease welfare program participation.

Loprest and Zedlewski (2006) estimate that the changes in welfare rules (including the Food Stamp Program) increased the percentage of employed families enrolled by 8.3 percent, from 20.9 percent in 1997 to 29.2 in 2002. At the same time, non enrolled labor-force participation decreased for that income group. The authors also find that real wages increased for that group from $5.50 to $7.00 per hour. In addition, the authors discuss the changes in welfare's effects on income, poverty.

Huffman and Jensen (2008) find an insignificant relationship between food insecurity and labor-force participation. It is possible that if food insecurity lowers the chance of participating in the labor-force, enrollment in the Food Stamp Program will compensate for this effect. In the authors' estimation of the determinants of Food Stamp

Participation, they find a negative and significant relationship between labor-force participation and Food Stamp enrollment.

IV. Theoretical Framework

Traditional economic theory notes that welfare programs create a modest disincentive for work. These studies often consider unemployment insurance and welfare, but neglect to isolate the Food Stamp Program.

The prevailing theory of household labor market-decision making is the labor-leisure preference model, which considers that individuals face a trade-off between work and leisure and will make a decision based on where the utility is maximized subject to a budget constraint (ie see Pollak, 2002). This paper will first introduce the typical utility framework that households may face, and then introduce new analysis in order to augment the current theory.

Consider the utility function $U(H, Y_d, FSP)$ where H is the hours worked, Y_d is disposable income, and FSP is earnings from the Food Stamp Program (following Hagstrom, 1996). Individuals will choose to participate in the Food Stamp Program if the benefits outweigh the costs. Since about one third of eligible households do not participate, it is likely that the costs of paperwork, transportation to the welfare offices, the offices' hours, and stigma associated are quite high (USDA, 2005). Benefits from the Food Stamp Program are simply an income subsidy for food items. Households that are enrolled in the Food Stamp program will participate in the labor-force if the benefits from labor are greater than the benefits from leisure given this in-kind subsidy. In short, if the net benefits from labor-force participation outweigh the net benefits from Food Stamp

program participation, the rational individual will best maximize their utility by joining the labor-force and taking on employment.

Although this model may work well in analyzing most income levels, families with very low income and asset levels may not even be able to consider the labor-leisure tradeoff and utility maximization. Needy households may lack basic necessities in order to be able to join the labor-force and therefore do not base their decisions on work versus leisure but instead on needs. Households' labor participation is based on needs. The needs model stipulates that family and individual expenses will likely outweigh labor and leisure preferences. Larger families will have a higher probability of participation and may have multiple income earners. Much evidence exists to show that labor-force participation decisions are made at a household level, which also supports a needs based model.

However, what if the household lacks the basic necessities even to be able to enter the labor market in the first place? Jensen (2002) estimates that nearly 30 percent of low income households are defined as food insecure, which is defined as limited or uncertain availability of nutritionally adequate and safe foods as well as uncertainty in acquiring food in the future. Households with constraints such as these will not be able to consider their labor-leisure preferences or their needs. Instead a separate theoretical method will be necessary.

It is likely that households need basic resources in order to seek employment. Similar to a firm, a household's resource based production of labor-force participation may be modeled by:

$LFP = f(y)$ and $y = A + Y_{un}$,

where A is a household's basic assets and Y_{un} is a household's unearned income. Considering a household has very low assets and income, the important resources become shelter, heat, energy, clothing, transportation, and nutrition. This resources model will attempt to isolate the most basic needs necessary for an individual to be employable. A diet containing an insufficient level of calories will be detrimental to employment status and will impair labor-force participation. Given this assumption, participation assistance programs like Food Stamps will provide individuals with the basic resources necessary to seek and attain employment.

V. Model Specification

The labor-force participation model was estimated using a probit regression where $LFP_{ist} = 1$ if an individual was considered a part of the labor-force using the Bureau of Labor Statistics definition. The probit model estimated for labor-force participation for individual *i*, in state *s*, and time *t* is:

$$P(LFP_{ist} = 1) = \alpha + \beta_1 FSP_{ist} + \beta_2 D_{it} + \beta_3 E_{st} + \tau_t + \varepsilon$$

where FSP_{ist} is a dummy variable indicating 1 for food stamp program participation in that month. D_{it} is a vector of demographic characteristics including the number of children in a family, indicators for race, educational attainment, citizenship status, and age and age nonlinearities. E_{st} is a vector of economic statistics including the monthly state employment to population ratio, monthly state unemployment rate, quarterly national real gross domestic product, and annual state real per capita income. τ_t is a set of year fixed effects and ε is an error term.

The same model was estimated using the Food Stamp Program payment amount, namely:

$P(LFP_{ist} = 1) = \alpha + \beta_1 FSA_{ist} + \beta_2 D_{it} + \beta_3 E_{st} + \tau_t + \varepsilon$,

where FSA_{ist} is now the dollar value of Food Stamp Program benefits received.

Lagged Food Stamp Program variables were also employed to see if the effects of participation are not immediate.

The model is: $P(LFP_{ist} = 1) = \alpha + \beta_1 FSA_{ist-1} + \beta_2 D_{it} + \beta_3 E_{st} + \tau_t + \varepsilon$.

The labor-force participation model was disaggregated by gender due to potential differences in the decision making process by gender.

$P(LFP_{mst} = 1) = \alpha + \beta_1 FSA_{ist-1} + \beta_2 D_{it} + \beta_3 E_{st} + \tau_t + \varepsilon$, where LFP_{mst} is the labor-force participation for males and

$P(LFP_{wst} = 1) = \alpha + \beta_1 FSA_{ist-1} + \beta_2 D_{it} + \beta_3 E_{st} + \tau_t + \varepsilon$, where LFP_{wst} is the labor-force participation for females.

Moving away from labor-force participation, Food Stamp Program participation may also have an effect on employment as cited literature indicates. To analyze this, a linear prediction equation was estimated. Using similar variables,

$Y_{ist} = \alpha + \beta_1 FSP_{ist} + \beta_2 D_{it} + \beta_3 E_{st} + \mu_s + \tau_t + \varepsilon$,

where Y is the number of hours worked per week and μ_s is a set of state dummy variables. Similar to the labor-force model, program payouts and lagged variable specifications were estimated as well.

$Y_{ist} = \alpha + \beta_1 FSA_{ist} + \beta_2 D_{it} + \beta_3 E_{st} + \mu_s + \tau_t + \varepsilon$ and

$Y_{ist} = \alpha + \beta_1 FSP_{ist-t'} + \beta_2 D_{it} + \beta_3 E_{st} + \mu_s + \tau_t + \varepsilon$ respectively.

These models will likely be the most appropriate for the study population in question.

VI. Study Population

A properly defined study population is critical to finding the true relationship between Food Stamp Program Participation and labor-force participation. Following Ratcliffe, McKernan, and Finegold (2007), the population must be defined in order to include individuals at the margin who will likely change their behavior based on appropriate costs and benefits. The population for this study may have experienced considerable income mobility, as well as changing state eligibility requirements.

Although Ratcliffe, McKernan, and Finegold (2007) focus on 175 percent of poverty, it is likely that if a Food Stamp household enters the labor-force, they may enter even a larger income bracket. This study will focus on working aged individuals 18 to 55 in households with income less than 200 percent of poverty in order to capture an even greater amount of income mobility due to entering and leaving the workforce. This population will give statistical freedom to employ various model specifications, while still targeting the individuals most likely to be directly affected by the Food Stamp Program.

VII. Sample Data

Individual level data comes from the 2001 Survey of Income and Program Participation (SIPP 2001). The panel is a nationally representative non-institutional sample of 36,000 households from October 2000 through December 2003. It oversamples low income households due to their higher propensity to leave a study early. This time period is particularly useful because it was well after the implementation of the

new welfare rules under TANF in 1996. Similarly, the data begins at a business cycle peak, moves through the 2001-2002 recession and back into a period of growth.

SIPP offers a large amount of individual and household data on income, Food Stamp Program participation, demographic characteristics, and other variables. Potential controls for this study, following the protocol of other studies, include metro status, number of children in the family, race (ie Black, Hispanic, or other), citizenship status, and age. The SIPP 2001 panel offers the most complete longitudinal dataset available for this study population. SIPP does experience "seam bias", where reporting occurs mostly during interview sessions and not at the actual date of the event (ie enrolling in the Food Stamp Program in the first month but reporting the third month because it was the interview month) (Ham, Li, Shore-Sheppard, 2007). In addition, underreporting occurs in SIPP, however it is lower than in CPS (Ratcliffe, McKernan, & Finegold, 2007).

In addition to the individual data, state and national economic controls are necessary. At the state level, monthly employment-to-population ratios and unemployment rates are used as reported by the Bureau of Labor Statistics. To control for the prevalent labor-leisure tradeoff, the most relevant income variable is used, namely real annual state per capita income as estimated by the Bureau of Economic Analysis. This was chosen to represent the average reservation wage from the labor-leisure model. To control national dynamics, quarterly real gross domestic product is also employed.

VIII. Results

The results section will be divided up based on model specifications. First, Food Stamp Program participation's influence on labor-force participation are analyzed based

on aggregate probit models and then on gender specific probit models. From there, analysis of employment based on number of hours worked per week will be discussed. Appendix 1 gives details on each variable employed.

In the estimation of working aged individuals with income of 200 percent of poverty or lower, we find that on average 12.2 percent of the sample participate in the Food Stamp program and receive around $25.63 per week. Nearly 72 percent live in Census Bureau defined metropolitan areas. 25.6 percent have not completed high school and another 35.6 percent only have a high school degree or equivalent. 24.4 percent of the sample is not reported as citizens.

Table 1. Summary Statistics

i. Dependent Variables

Variable	Observations	Mean	Standard Deviation
Hours worked	574895	14.210	19.081
Labor-force participation	574895	0.758	0.429

ii. Independent Variables

Variable	Observations	Mean	Standard Deviation
Food Stamp participation	574895	0.122	0.327
Food Stamp allotment	574895	25.627	85.802
Metro	574895	0.719	0.449
Number of children	574895	1.399	1.438
Employment-to-population ratio	574895	62.759	3.279
Unemployment rate	574895	5.426	1.030
Real GDP	574895	10038.390	166.397
Real income per capita	574895	29150.200	3781.866

Black	574895	0.192	0.394
Hispanic	574895	0.221	0.415
Other	574895	0.0532	0.224
Less than high school	574895	0.256	0.436
High school only	574895	0.356	0.479
Noncitizen	574895	0.244	0.429
Age	574895	34.899	10.361

i. Labor-force Participation

a. Full Sample Model

In the labor-force participation probit model, Food Stamp program participation has a negative sign and is highly significant. This implies that as an individual participates in the program, the chance of being counted in the labor-force deceases by 18.68 percent. Similarly, when modeled with Food Stamp monthly allotments, a significant and negative sign is found. Labor-force participation probability decreases by 4.3% with an increase of $100 dollars per month. Appendix 3 displays this model specification.

This result offers some evidence against the theory of food stamps being an effective program to increase the resources necessary to work. It is possible that during this time period low income workers found the costs of enrolling in the Food Stamp program to outweigh the benefits. Time constraints due to work, welfare office hours, transportation needs, and stigmas may help explain this phenomenon. In addition, those who enrolled in the Food Stamp program may have not had these costs since they were not originally working and choose not to work due to labor-leisure preferences. It is also

possible that enrollment in the Food Stamp program creates a modest disincentive to join the labor-force. If an individual's needs are being met with Food Stamps and other public programs, they might be less likely to seek employment.

This result may be due to the sample specifications as well. The food as resource hypothesis may only apply to a very low income subset of the population. Also, after enrolling in Food Stamps and gaining employment, individuals may move out of the 200 percent of poverty level and will be no longer be captured in the data. Moving out of the 130 percent of poverty level makes a household ineligible for Food Stamps and therefore will create a correlation in the model where individuals participate in the program, then stop when they become employed. In addition, two-way causation may exist in the model. It is difficult to say whether participating in the Food Stamp Program would affect an individuals labor force decisions, or if participation in the labor force is influencing an individual's decision to enroll in the program. Also, Lagged variable models were also created and the results were similar, although the magnitudes of the Food Stamp coefficients were smaller. See appendix 4 for the full results of the lagged models.

Other individual determinants of labor-force participation remain statistically consistent across model specifications. Considering the Food Stamp Participation explanatory labor-force model, metro status has a negative effect on labor-force participation. A household's geographic location negatively impacts the chance of being in the labor-force by one percent. Having children in the family increases the chance of participating by three tenths of a percent. The needs of individuals' with children likely overpower their labor-leisure preferences, and as the number of children in their family

increases, these needs increase, therefore making the individual more likely to participate in the labor-force.

Race also plays a significant role in being counted in the labor-force. Individuals reporting Hispanic are 2.8 percent more likely participate, while individuals reporting other are 5.1 percent less likely to participate. Citizenship status is also negatively correlated with participation; noncitizens are two percent less likely to be in the labor-force. This is possibly due to language issues, as well as difficulty adjusting to labor-force dynamics in the United States. Noncitizens may also lack the appropriate documentation to work and therefore may not attempt to find work.

Age is an important determinant as well; between the ages of 18-55 as an individual's age increases their chance of participating in the labor-force increases by nearly 4 percent. This is likely also evidence for the needs hypothesis. As age increases, it is likely that medical, family, and household necessities increase, making labor-force participation more important.

In addition to individual characteristics, economic determinants play a significant role in labor-force participation. The employment to population ratio and unemployment rate both have positive correlations likely capturing general state economic conditions. An interesting result is a negative sign for real national gross domestic product and real state income per capita. Since these measures are of living standards, increasing living standards decrease the needs of an individual. Possibly another worker in the family's income is strong enough to support the family and therefore labor-force participation is unnecessary. The coefficients are small in magnitude and may also be due to some sampling or modeling issue.

b. Female Model

When analyzing the female subset of the study sample, the negative relationship between Food Stamp Program participation and labor-force participation remains. In this specification the effect is smaller in magnitude. Namely, participation in the program leads to a 12.1 percent decrease in the probability of being counted in the labor-force. The economic determinants remain similar to the full sample model. Also, race, education, citizenship, and age variables stay consistent, although their magnitudes have decreased slightly.

The differences in the female model from the complete model are interesting to note. Metropolitan status is no longer a significant predictor; it is possible that labor-force and employment decisions are not greatly affected by household geographic location and other factors overpower this determinant. A significant and now negative factor is number of children in the family. As a family has more children, it is likely that the typical gender norms take over in two family households. Mothers will stay home with the children; men will continue to work.

c. Male Model

Again, the male model captures the same negative correlation between participation in the Food Stamp program and labor-force participation. However, the magnitude is much greater than both the female model and the full model specifications. Participation leads to a decrease of nearly 26 percent in probability of being in the labor-force. The utility gains from the Food Stamp Program in this model are likely stronger than the gains from participation in the labor-force. Again, the resource theory of labor-force participation is not evidenced by this result. However, women on Food Stamps are

more likely to work than men on Food Stamps, holding economic and demographic characteristics constant. This is of particular value to policy makers; it appears that the TANF welfare reforms and new Food Stamp Program rules have been successful in moving women, including single mothers, into the workforce. This study does not analyze its effects on their family, poverty level, income, or education and should not be interpreted in that way. Moving single parents from the home to the workforce could have serious unintended consequences.

In terms of demographics, there are a number of significant differences between the full and female models. First, male individuals who reported their race as black where significantly less likely to be considered a part of the labor-force. In marginal terms, this implies a 9.5 percent lower probability of participation. Individuals reporting Hispanic or other as racial status exhibit similar probabilistic effects to the full and female models. Male noncitizens are actually more likely to be counted in the labor-force by a statistically significant 1 percent, differing from both other models. This could be due to male migrant workers from Mexico and Latin America coming to find work in the United States, while female noncitizens are coming to the United States in the traditional gender role with their husband.

Household characteristics also differ in the male model. The number of children in the individual's family is now a significant and positive determinant, unlike the female estimation. An additional child in the family leads to a 2.4 percentage point increase in the probability of participating in the labor market. Here the gender based social norms may dominate again. As families expand in size, males become more likely to join the workforce, which gives evidence for the needs hypothesis. Family needs outweigh the

labor-leisure preferences in the male model and this model explains a larger percentage of probability than the other models (ie Pseudo R^2 = 0.091 vs. 0.039).

ii. Employment Model

An alternative way to consider the effect of Food Stamp Program participation on labor-force dynamics is to analyze its interactions with weekly hours worked. Appendix 6 displays the linear regression results. This section will be divided into two parts: discussion of the linear models and discussion of the lagged linear models.

a. Linear Model

The linear employment model attempts to isolate the determinants of hours worked for individuals. Consistent with previously stated results, the coefficient for Food Stamp Program participation is negative and significant. Participation in the program is estimated to decrease the number of hours worked per week by 4.36 hours on average holding economic and demographics constant. Similarly, a negative relationship is also found when analyzing the Food Stamp dollar allotments. An increase of $100 per month in benefits leads to a 1.2 hour decrease in hours worked per week. This result can imply that an individual enrolled in the Food Stamp Program will trade labor for leisure due to the net benefits of additional work hours being negative. This result could also be due to a number of Food Stamp participants not working, bringing down the average hours worked.

Demographic characteristics also influence number of hours worked by an individual. Unlike the labor-force models, black racial status and high school only education are not significant. An individual with educational status less than high school works on average two hours less per week than those with more education. This may be

due to the difficulty of finding a full time position with limited education and skills. Metropolitan status significantly decreases employment time by a third of an hour. Similar to the labor force participation models, a higher number of children in a family increase the number of hours worked. Reported Hispanics work on average an hour more per week than other races, while individuals who reported other as racial status work 1.4 fewer hours than the average. Citizenship status is negative and significant; noncitizens work nearly a third of an hour less per week. The age of the individual is positive and significant.

Not only are demographic characteristics important, but economic characteristics are as well. In the hours worked model, neither the employment to population ratio is significant nor the unemployment rate. However, real national gross domestic product is estimated again with a negative and significant relationship. In this model, unlike the labor force models, real income per capita has a positive and significant relationship to employment. An increase of $1,000 income per capita leads to a two-fifths of an hour increase in hours worked per week. This gives some evidence for labor-leisure theory; wages are the opportunity cost of not being employed and as they increase, the opportunity cost of not working increases, making some individuals choose to work more hours.

b. Lagged Linear Models

The hours worked model was also estimated using a one month and six month lagged Food Stamp participation variable. Results for both models remained relatively consistent with the non-lagged specification. In the lagged models, real gross domestic product is not significantly related to hours worked. In the six month lag, the

employment-to-population ratio is no longer significant. This may be due to a lag between Food Stamp participation and labor force participation. In addition, black racial status is no longer significant. For detailed results, see appendix 7.

IX. Conclusions

During the study time period, it is possible that the net benefits from working were greater than the net benefits from the Food Stamp program for non participants, while the net benefits from working were negative for some of the participants of the Food Stamp program. Coming out of mild recession of 2001, the majority of the SIPP 2001 panel is during a growth period. Increased economic opportunity made the net benefits from labor-force participation and employment greater than the net benefits from Food Stamp participation.

The various model specifications give some evidence for the traditional neoclassical labor-leisure preference model. A negative relationship between Food Stamp variables and labor-force variables could imply that the opportunity cost of not working is decreased when an individual enrolls in the Food Stamp program. Also, a significant relationship between real income per capita and individual hours worked per week implies that an individual considers the prevailing wage level as an important determinant in the labor-force decision making process. Similarly, an individual's educational attainment effectively changes their opportunity cost of leisure. Lower educational status implies that the individual could receive a lower wage, on average, therefore decreasing hours worked or dropping out of the labor force all together.

The models also give some evidence for the needs based theory of employment. For families, more children lead to higher participation probabilities and more hours worked. A family with more children will require a higher level of income in order to sustain a reasonable standard of living. In this case, the needs of the family outweigh the preferences of the individual and labor force decisions are made based partly on needs. Similarly, as an individual's age increases, their probability of labor force participation increases and their hours worked per week increases. This could also support the needs hypothesis. In the earlier years, individuals leave their parents and would require larger incomes to support themselves. Later, as they have a family of their own, the needs of the family force them to increase their labor.

Although there is evidence for both the labor-leisure theory and the needs hypothesis, there is virtually no evidence for the resources hypothesis. The negative relationship between Food Stamp variables and labor force variables implies that this sample is not using Food Stamps as resources to enter the labor force or work more. It is possible that 200 percent of poverty is too large of a sample and this theory may only apply to a much smaller subset of the population. Also, an instrumental variable approach would help to tease out the direction of causality between Food Stamp enrollment and labor force dynamics.

These results should be interpreted with caution. It was not the intent of the Food Stamp program to be a resource for employment; instead, it was meant to provide nourishment for families in need. The program has documented positive economic effects and small negative effects on labor force dynamics do not negate its ability to serve those in need.

X. References

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Appendix 1. Variable Definitions

i. Dependent Variables

Hours worked	Number of hours worked per week as reported by individual
Labor-force participation	1 if individual is counted in the labor-force using the Bureau of Labor Statistics definition, 0 if not

ii. Independent Variables

Food Stamp Participation	1 if individual is enrolled in the Food Stamp program for the current, 0 if no
Food Stamp Allotment	The dollar value of household Food Stamps received
Metro	1 if household location is considered metropolitan based on Census definition, 0 if no
Number of children	The number of children in the household
Employment-to-population ratio	The ratio of individuals in the labor-force to working aged population (18-55) by state and month
Unemployment rate	Monthly state unemployment rates
Real GDP	Quarterly National Gross Domestic Product in billions of chained year 2000 dollars
Real income per capita	Annual state personal income per capita in constant year 2000 dollars
Black	1 if individual reported black as racial status, 0 if not
Hispanic	1 if individual reported Hispanic as racial status, 0 if not
Other	1 if individual reported other (not including white) as racial status, 0 if not
Less than high school	1 if individual reported education status to not have completed high school, 0 if not
High school only	1 if individual reported education status to have completed high school only, 0 if not
Noncitizen	1 if individual reported not being a citizen of the United States, 0 if not
Age	The age of individual in years

Appendix 2. Summary Statistics

i. Dependent Variables

Variable	Observations	Mean	Standard Deviation
Hours worked	574895	14.210	19.081
Labor-force participation	574895	0.758	0.429

ii. Independent Variables

Variable	Observations	Mean	Standard Deviation
Food Stamp participation	574895	0.122	0.327
Food Stamp allotment	574895	25.627	85.802
Metro	574895	0.719	0.449
Number of children	574895	1.399	1.438
Employment-to-population ratio	574895	62.759	3.279
Unemployment rate	574895	5.426	1.030
Real GDP	574895	10038.390	166.397
Real income per capita	574895	29150.200	3781.866
Black	574895	0.192	0.394
Hispanic	574895	0.221	0.415
Other	574895	0.0532	0.224
Less than high school	574895	0.256	0.436
High school only	574895	0.356	0.479
Noncitizen	574895	0.244	0.429
Age	574895	34.899	10.361

Appendix 3. Full Sample Labor-force Participation Probit Model

i. Food Stamp Participation

Dependent variable = Labor-force participation (N = 574895)	**Log pseudolikelihood** = -304263.6 **Wald chi^2** = 27403.21 *** **Pseudo R^2** = 0.0444
Variable	**Coefficient**
Food Stamp participation	-0.541*** (0.005)
Metro	-0.029*** (0.004)
Number of children	0.008*** (0.001)
Employment-to-population ratio	0.019*** (0.001)
Unemployment rate	0.012*** (0.003)
Real GDP	-4.53e-5* (2.55e-5)
Real income per capita	-7.14e-6*** (5.36e-7)
Black	0.008 (0.005)
Hispanic	0.093*** (0.006)
Other	-0.159*** (0.008)
Less than high school	-0.328*** (0.005)
High school only	-0.051*** (0.004)
Noncitizen	-0.062*** (0.005)
Age	0.121*** (0.001)
Age Squared	-0.002*** (1.81e-5)

Probit model includes year fixed effects. Robust standard errors are in parentheses. * denotes significance at $\alpha = .1$, ** denotes significance at $\alpha = .05$, *** denotes significance at $\alpha = .01$.

ii. Food Stamp Allotment

Dependent variable = Labor-force participation (N = 574895)	**Log pseudolikelihood** = -306977.43 **Wald chi^2** = 22139.04 *** **Pseudo R^2** = 0.0359
Variable	**Coefficient**
Food Stamp allotment	-0.001*** (2.09e-5)
Metro	-0.022*** (0.004)
Number of children	0.013*** (0.001)
Employment-to-population ratio	0.019*** (0.001)
Unemployment rate	0.011*** (0.003)
Real GDP	-4.38e-5* (2.54e-5)
Real income per capita	-6.96e-6*** (5.34e-7)
Black	-0.015*** (0.005)
Hispanic	0.095*** (0.005)
Other	-0.152*** (0.008)
Less than high school	-0.324*** (0.005)
High school only	-0.062*** (0.004)
Noncitizen	-0.052*** (0.005)
Age	0.117*** (0.001)
Age Squared	-0.002*** (1.81e-5)

Probit model includes year fixed effects. Robust standard errors are in parentheses. * denotes significance at $\alpha = .1$, ** denotes significance at $\alpha = .05$, *** denotes significance at $\alpha = .01$.

Appendix 4. Full Sample Labor-force Participation Lagged Model

i. 1 month lag

Dependent variable = Labor-force participation (N = 543435)	**Log pseudolikelihood** = -286701.25 **Wald chi^2** = 25455.86 *** **Pseudo R^2** = 0.0437
Variable	**Coefficient**
Food Stamp participation (lag)	-0.537*** (0.006)
Metro	-0.031*** (0.005)
Number of children	0.010*** (0.001)
Employment-to-population ratio	0.019*** (0.001)
Unemployment rate	0.011*** (0.003)
Real GDP	-3.75e-5 (2.63e-5)
Real income per capita	-7.14e-6*** (5.53e-7)
Black	0.010** (0.005)
Hispanic	0.092*** (0.006)
Other	-0.158*** (0.009)
Less than high school	-0.326*** (0.005)
High school only	-0.051*** (0.005)
Noncitizen	-0.051*** (0.005)
Age	0.119*** (0.001)
Age Squared	-0.002*** (1.88e-5)

Probit model includes year fixed effects. Robust standard errors are in parentheses. * denotes significance at $\alpha = .1$, ** denotes significance at $\alpha = .05$, *** denotes significance at $\alpha = .01$.

ii. 6 month lag

Dependent variable = Labor-force participation (N = 419277)	**Log pseudolikelihood** = -216259.83 **Wald chi^2** = 18794.03 *** **Pseudo R^2** = 0.0427
Variable	**Coefficient**
Food Stamp participation (lag)	-0.542*** (0.006)
Metro	-0.034*** (0.005)
Number of children	0.016*** (0.002)
Employment-to-population ratio	0.019*** (0.001)
Unemployment rate	0.011*** (0.003)
Real GDP	-5.17e-5* (3.00e-5)
Real income per capita	-7.95e-6*** (6.38e-7)
Black	0.017*** (0.006)
Hispanic	0.082*** (0.007)
Other	-0.167*** (0.010)
Less than high school	-0.315*** (0.006)
High school only	-0.053*** (0.005)
Noncitizen	-0.016*** (0.006)
Age	0.121*** (0.002)
Age Squared	-0.002*** (2.20e-5)

Probit model includes year fixed effects. Robust standard errors are in parentheses. * denotes significance at $\alpha = .1$, ** denotes significance at $\alpha = .05$, *** denotes significance at $\alpha = .01$.

Appendix 5. Gender Specific Labor-force Participation Models

i. Female

Dependent variable = Labor-force participation (N = 315805)	**Log pseudolikelihood** = -185471.22 **Wald chi^2** = 15030.77 *** **Pseudo R^2** = 0.0394
Variable	**Coefficient**
Food Stamp participation	-0.336*** (0.006)
Metro	-0.004 (0.006)
Number of children	-0.041*** (0.002)
Employment-to-population ratio	0.022*** (0.001)
Unemployment rate	0.016*** (0.003)
Real GDP	2.15e-5 (3.31e-5)
Real income per capita	-6.08e-6*** (6.89e-7)
Black	0.234*** (0.006)
Hispanic	0.043*** (0.007)
Other	-0.062*** (0.011)
Less than high school	-0.391*** (0.007)
High school only	-0.068*** (0.006)
Noncitizen	-0.156*** (0.006)
Age	0.097*** (0.002)
Age Squared	-0.001*** (2.41e-5)

Probit model includes year fixed effects. Robust standard errors are in parentheses. * denotes significance at $\alpha = .1$, ** denotes significance at $\alpha = .05$, *** denotes significance at $\alpha = .01$.

ii. Male

Dependent variable = Labor-force participation (N = 259090)	**Log pseudolikelihood** = -107911.92 **Wald chi^2** = 19518.74 *** **Pseudo R^2** = 0.0909
Variable	**Coefficient**
Food Stamp participation	-0.821*** (0.012)
Metro	-0.049*** (0.007)
Number of children	0.101*** (0.002)
Employment-to-population ratio	0.016*** (0.001)
Unemployment rate	0.010** (0.004)
Real GDP	-1.37e-4*** (4.17e-5)
Real income per capita	-6.99e-6*** (8.89e-7)
Black	-0.345*** (0.008)
Hispanic	0.166*** (0.009)
Other	-0.307*** (0.013)
Less than high school	-0.332*** (0.008)
High school only	-0.054*** (0.007)
Noncitizen	0.045*** (0.008)
Age	0.164*** (0.002)
Age Squared	-0.002*** (2.92e-5)

Probit model includes year fixed effects. Robust standard errors are in parentheses. * denotes significance at $\alpha = .1$, ** denotes significance at $\alpha = .05$, *** denotes significance at $\alpha = .01$.

Appendix 6. Hours Worked Linear Regression Model

i. Food Stamp Participation

Dependent variable = Hours worked (N = 574895)	**F(18, 574831)** = 538.44 *** **R^2** = 0.0321
Variable	**Coefficient**
Food Stamp participation	-4.362*** (0.070)
Metro	-0.321*** (0.068)
Number of children	0.058*** (0.019)
Employment-to-population ratio	0.036 (0.067)
Unemployment rate	-0.012 (0.077)
Real GDP	-9.12e-4*** (3.50e-4)
Real income per capita	2.16e-4** (1.01e-4)
Black	-0.102 (0.070)
Hispanic	0.902*** (0.079)
Other	-1.387*** (0.119)
Less than high school	-2.058*** (0.067)
High school only	-0.015 (0.060)
Noncitizen	-0.316*** (0.064)
Age	0.957*** (0.017)
Age Squared	-0.014*** (2.42e-4)

Regression model includes state and year fixed effects. OLS coefficient estimates with robust standard errors are in parentheses. * denotes significance at $\alpha = .1$, ** denotes significance at $\alpha = .05$, *** denotes significance at $\alpha = .01$.

ii. Food Stamp Allotment

Dependent variable = Hours worked (N = 574895)	**F(18, 574831)** = 426.55 *** **R^2** = 0.0244
Variable	**Coefficient**
Food Stamp allotment	-0.012*** (2.76e-4)
Metro	-0.289*** (0.068)
Number of children	0.097*** (0.019)
Employment-to-population ratio	0.031 (0.067)
Unemployment rate	-0.016 (0.077)
Real GDP	-9.05e-4** (3.51e-4)
Real income per capita	-2.19e-4** (1.02e-4)
Black	-0.278*** (0.070)
Hispanic	0.885*** (0.080)
Other	-1.347*** (0.119)
Less than high school	-2.240*** (0.067)
High school only	-0.084 (0.060)
Noncitizen	-0.259*** (0.064)
Age	0.942*** (0.017)
Age Squared	-0.014*** (2.42e-4)

Regression model includes state and year fixed effects. OLS coefficient estimates with robust standard errors are in parentheses. * denotes significance at $\alpha = .1$, ** denotes significance at $\alpha = .05$, *** denotes significance at $\alpha = .01$.

Appendix 7. Lagged Hours Worked Linear Regression Model

i. 1 month lag

Dependent variable = Hours worked (N = 543435)	**F(18, 543371)** = 505.07 *** **R^2** = 0.0505
Variable	**Coefficient**
Food Stamp participation (lag)	-4.379*** (0.071)
Metro	-0.355*** (0.070)
Number of children	0.074*** (0.019)
Employment-to-population ratio	0.080 (0.069)
Unemployment rate	-0.022 (0.079)
Real GDP	5.81e-4 (3.60e-4)
Real income per capita	2.16e-4** (1.05e-4)
Black	-0.099 (0.072)
Hispanic	0.891*** (0.082)
Other	-1.374*** (0.123)
Less than high school	-2.04*** (0.067)
High school only	-0.017 (0.062)
Noncitizen	-0.233*** (0.067)
Age	0.937*** (0.018)
Age Squared	-0.013*** (2.50e-4)

Regression model includes state and year fixed effects. OLS coefficient estimates with robust standard errors are in parentheses. * denotes significance at $\alpha = .1$, ** denotes significance at $\alpha = .05$, *** denotes significance at $\alpha = .01$.

ii. 6 month lag

Dependent variable = Hours worked (N = 419277)	**F(18, 574831)** = 374.42 *** **R^2** = 0.0817
Variable	**Coefficient**
Food Stamp participation	-4.43*** (0.079)
Metro	-0.368*** (0.079)
Number of children	0.131*** (0.022)
Employment-to-population ratio	0.182** (0.080)
Unemployment rate	-0.034 (0.091)
Real GDP	-4.79e-4 (4.10e-4)
Real income per capita	2.43e-4** (1.21e-4)
Black	-0.212** (0.082)
Hispanic	0.675*** (0.095)
Other	-1.462*** (0.143)
Less than high school	-1.979*** (0.079)
High school only	-0.030 (0.071)
Noncitizen	-0.017 (0.081)
Age	0.858*** (0.021)
Age Squared	-0.012*** (2.93e-4)

Regression model includes state and year fixed effects. OLS coefficient estimates with robust standard errors are in parentheses. * denotes significance at α = .1, ** denotes significance at α = .05, *** denotes significance at α = .01.