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# The Food Stamp Program and Food Insufficiency

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A major goal of the Food Stamp Program is to provide access to a nutritious diet for low-income households. One requirement in fulfilling this goal is that households have enough food to eat, i.e. that they are food sufficient. An important question in any comprehensive evaluation of the Food Stamp Program is then: How well does it help alleviate food insufficiency? In this paper, we provide a preliminary answer by econometrically estimating the influence of food stamps on the probability of self-assessed food insufficiency for households eligible for the program.

We begin the paper with a theoretical model of the simultaneous decision about program participation and food consumption. Before describing the econometric estimation of this model, we discuss the data set we use, the 1991 and 1992 panels from the Survey of Income and Program Participation (SIPP). The possibility that households more likely to participate in the program are also more likely, *a priori*, to be food insufficient complicates the analysis. If this is the case, the effect of food stamps on food insufficiency should be modeled as endogenous rather than exogenous. By using a simultaneous equation model with two probits, we incorporate this endogeneity into our econometric analysis. We present results from it along with a policy simulation and then analyze the implications arising from the existence of endogeneity.

**Theoretical Model**

We model two interrelated outcomes of a household -- their Food Stamp Program participation decision and their food insufficiency status -- both within a utility maximizing framework which presumes a household is eligible for the program. A household has a utility function, U(•). The income available to a household to maximize their utility will differ depending

upon their participation decision. If they participate, their income will be

$Y^P = EINC^P + TINC^P + OINC^P + FSB.$

If they do not participate, their income will be

$Y^{NP} = EINC^{NP} + TINC^{NP} + OINC^{NP}$

where P is a participating household, NP is a non-participating household, EINC is current earned income, TINC is transfer income, OINC is other income, and FSB is food stamp benefits. The variables differ in terms of the participation decision because the participation decision may also affect labor supply decisions (EINC), participation in other assistance programs (TINC), and the drawing down of savings ( as reflected in OINC).

The disutility to participation is expressed as C=C(S,T). "Stigma" (S) refers to the distaste a person associates with participation. This encompasses a wide variety of sources, from a person's own distaste for receiving food stamps to his desire to avoid disapproval from others when redeeming food stamps to the negative reaction he may face from caseworkers[1]. (For more on the influence of stigma on welfare participation see Moffitt, 1983.) "Transaction Costs@ (T) incorporates (but is not limited to) the amount of time to get to the food stamp office and the time spent in those offices; the burden of taking children to the office or paying for babysitting services; and the availability and costs of transportation. A household faces these costs on a repeated basis during recertification in order to maintain eligibility in the program. Other costs that a household faces only once, when applying for the program, include the time and effort needed to acquire all

[1]Approximately 40 percent of food stamps are delivered through the Electronic Benefits Transfer (EBT) system in 1998. One of the justifications for its use is to decrease the stigma of using food stamps. However, in the time frame of this paper, EBT was not in place.

the necessary paperwork and to fill out the application forms.

There is also a disutility associated with being food insufficient. This is expressed as D(FI) where FI denotes food insufficiency. Let $F_{min}$ be the minimum amount of food necessary to maintain food sufficiency. This will vary by household size. If a household's food intake is less then $F_{min}$ they are food insufficient (FI=1); if a households food intake is greater than $F_{min}$ they are food sufficient (FI=0) . D(FI) is greater than zero if FI=1 but is equal to zero if FI=0. This disutility includes the sensation of hunger felt by some or possibly all family members; the ramifications associated with food insufficiency for household members (e.g. decreased ability to concentrate in school for children); and the shame parents may feel about being unable to obtain sufficient food for their children.

The participation decision of a household can be expressed as

$$P=U(Y^{P}) + ( (^{NP} - (^{P})D(FI) - U(Y^{NP}) - C(S,T) \qquad (1)$$

where U(@), D(@), and C(@) are scaled such that P=0 where the household is indifferent between participation and non-participation. So, if P > 0 a household participates; if P # 0, the household does not. The parameters $(^{NP}$ and $(^{P}$ reflect a households subjective assessment of their probability of food insufficiency as a non-participant and as a participant. If $(^{NP}$ is greater than $(^{P}$ a household is, *ceteris paribus*, more likely to join the program and vice-versa. If $(^{NP}$ is equal to $(^{P}$ a household does not see any benefit or cost to enrolling in the program in terms of food insufficiency.

Coincident with the participation decision, the household decides on its consumption stream for the upcoming month. A household maximizes the utility function, U(F,OG), subject to

the budget constraint, $Y=P_F F+ P_{OG}OG$, where F is food, OG is other goods (which can include savings), $P_F$ is the price of food, and $P_{OG}$ is the price of other goods. The household's utility maximization yields the following reduced-form demand equation for food

$F^*=f(P_F,P_{OG},EINC^P,TINC^P,OINC^P, FSB)$ if $P > 0$ and (2)

$F^*=f(P_F,P_{OG},EINC^{NP},TINC^{NP},OINC^{NP},0)$ if $P \# 0$

Let $F_{min}$ be the minimum food consumption necessary to maintain food sufficiency. Then, if $F^* - F_{min} \$ 0$ a household is food sufficient; if $F^* - F_{min} < 0$ a household is food insufficient.

There are four possible outcomes in terms of food sufficiency and participation.

- food sufficient, food stamp household or $F^* - F_{min} \$ 0$, $P > 0$
- food insufficient, food stamp household or $F^* - F_{min} < 0$, $P > 0$
- food sufficient, non-food stamp household or $F^* - F_{min} \$ 0$, $P \# 0$
- food insufficient, non-food stamp household or $F^* - F_{min} < 0$, $P \# 0$

Of particular importance to the model here is the dependence of the food stamp participation decision on a household's assessment of their probability of food insufficiency and vice versa. This interdependence is reflected in equations (1) and (2).

**Data**

We use data from the 1991 and 1992 panels of the SIPP, a multipanel longitudinal survey of the non-institutional population of the U.S. The SIPP is one of the most comprehensive, nationally representative surveys with the information needed to identify households meeting the program's eligibility requirements. It is divided into two major sections, a set of core questions used in every wave (a four month time period) which collect information on household characteristics such as monthly earnings and participation in government programs, and a set of

topical modules which contain questions asked periodically of each panel. The USDA food sufficiency question was asked in the final two months of wave 6 of the 1991 panel and wave 3 of the 1992 panel and so we use these waves for our analysis. Because each wave has four rotation groups, each with different interview months, the final two months differ between households. The months range from August-September to November-December.

Respondents are asked to describe their household's recent food intake in terms of the USDA food sufficiency question: *Which of these statements best describe the food eaten in your household in the last four months?* They have four choices: *enough of the kinds of food we want to eat; enough but not always the kinds of food we want to eat; sometimes not enough to eat; or often not enough to eat*. Those households reporting that they sometimes or often do not get enough to eat are considered food insufficient and are asked a further question: *in what month(s) did your household not have enough to eat?*

In this paper, we confine our sample to households eligible for the program in this final month of the wave and thus consider a household food insufficient only if they were food insufficient in the final month. By doing so we are able to isolate the interaction of food stamps and food insufficiency. Households receiving Aid to Families with Dependent Children (AFDC) or Supplemental Security Income (SSI) are automatically eligible for food stamps. The eligibility criteria for other households include gross and net income limits and an asset limit.

*Gross Income Test*: A household's before tax income the previous month must be at or below

130 percent of the poverty line[2] though households with disabled persons or headed by someone over the age of 60 are exempt.

*Net Income Test*: After passing the gross income test, a household must have a net monthly income at or below the poverty line. Net income was calculated in the following manner in 1992. A standard deduction of $122 was subtracted from a households' gross income. Households with earnings from the labor market deduct 20 percent of these earnings from their gross income. Households incurring expenses in the care of their children and/or disabled dependents deduct up to $160 per month. A medical deduction for expenses above $35 per month and a shelter deduction for costs in excess of 50 percent of a household's net income (computed before the shelter deduction) are also used. The shelter deduction is capped at $194 except for elderly or disabled households which do not have a cap.

*Asset Test*: Finally, net income-eligible households must meet an asset test. All net income eligible households with assets less than $2,000 qualify for the Program ($3,000 for households headed by someone over age 60). The value of a vehicle above $4,500 is also considered as an asset unless it the vehicle is used for work or for the transportation of disabled persons.

The sample from which eligible households is drawn contains all households in the 1991

[2]In 1992, for a family of four, two parents and two children, 130 percent of the annual poverty line was $18,496.

and 1992 panels with deletions for (a) incomplete records in terms of food sufficiency status or one of the variables used to establish eligibility; (b) residency in Hawaii, Alaska, Idaho, Montana, or Wyoming (food stamp benefits are higher in Hawaii and Alaska and, hence, must be treated differently when calculating expected food stamp benefits but Alaska is identified jointly with Idaho, Montana, and Wyoming in the SIPP to protect confidentiality and so households in these states can not be identified separately); (c) households with multiple families (the food stamp unit can differ from the family unit but this distinction is not possible in the SIPP); (d) households with zero or negative incomes (a recent study showed that such households with zero or negative incomes are very different from households with incomes slightly above zero in terms of annual income and assistance program participation (Wemmerus and Porter, 1996.)); and (e) SSI recipients in California who are ineligible for the program. After these exclusions, there are 24,158 households in the full sample of which 3,452 households are eligible for the program (14.3 percent)

The expected monthly food stamp benefit level (EFSB) for eligible households is the maximum food stamp allotment, based on household size, less thirty percent of a family's net income[3]. For households with one or two persons, the minimum benefit level is $10 per month. We assigned the actual food stamp benefit level to food stamp households with a negative EFSB (2.2 percent of the eligible sample) and non food-stamp households with a negative EFSB (3.1

[3]In 1992,The maximum food stamp allotment is $111 for a one person household; $203 for a two-person; $292 for a three-person; $370 for a four-person; $440 for a five-person; $528 for a six-person; $584 for a seven-person; $667 for an eight-person; and $83 for each additional person.

percent of the eligible sample) were dropped[4].

Descriptive statistics for variables used in the econometric analysis are in Table 1. Columns 1 and 2 are for eligible food stamp recipients and non-recipients. Out of eligible households, 41 percent are program participants[5]. Of particular interest is the difference between the EFSB and the actual benefit level for participants. The mean values are very close, -$3.44 apart, but there is a wide variance in the difference: 31.2 percent of food stamp households have EFSB within 10 percent of their actual benefits; 49.2 percent within 25 percent; and 69.7 percent within 50 percent. Food insufficient households constitute 8.6 percent of recipients versus 4.4 percent of non-recipients. As we discuss in the econometric results, the higher food insufficiency rates for recipients is due to other factors correlated with food stamp usage and is not due to food stamps.

Approximately 25 percent of food stamp recipients are seemingly ineligible according to the SIPP. This may be due to two primary reasons. First, recipients may not report increases in income or changes in family status to food stamp caseworkers. These recipients may have been eligible at some time but not in the month being studied here. Second, some of these households may have been ineligible based on information from a future or past month when the SIPP was

[4]Households categorically eligible for food stamps could conceivably have enough income such that they would be ineligible if the eligibility criteria for non-categorically eligible households were applied. In such a case, they would have a negative EFSB.

[5]The participation rate is higher in reality than it is in the SIPP due to underreporting and other factors (see, e.g. Bollinger and David, 1997). The Food and Nutrition Service of the USDA calculated a household participation rate of 68.9 percent in January of 1992 (Cody and Trippe, 1997). However, this is not a direct comparison because their calculation was based on a different methodology: The number of eligibles (the denominator) was established using the SIPP but the number of participants (the numerator) was established using program operations data.

administered but are eligible in the current month[6]. To compare the characteristics of all food stamp recipients with only "eligible" recipients, the column 3 is for both "ineligible" and "eligible" food stamp recipients. In general, the characteristics of the two groups are similar. In particular, the food stamp benefit levels are very similar between the two groups. The major difference, by definition, is between the average incomes.

Table 2 has descriptive statistics comparing food sufficient and food insufficient households in terms of the same variables in Table 1. In the sample of eligible households, 5.9 percent are food insufficient. The average difference between EFSB and actual food stamp benefits is smaller for food sufficient households (-$2.36) than for food insufficient households (-$16.31). Out of food sufficient households, 40.0 percent receive food stamps and 58.0 percent of food insufficient households receive them.

Before turning to the econometric estimation, the advantages to using SIPP as opposed to more limited data sets in this type of analysis should be emphasized. In particular there are four advantages not present with other data sets. First, the information needed to calculate net income eligibility and EFSB is available. Second, asset information is broken down by source, allowing a more precise estimate of eligibility. Because approximately 30 percent of income eligible households are asset ineligible, it is imperative that asset information be incorporated into analyses

[6]For example, a household in the wave 3 of the 1992 panel may not have had assets less than $2,000 but by wave 4 (when asset information was collected) they may have had more than $2,000. They would have been eligible in the month in question in wave 3 but not according to the SIPP.

dependent on accurate assessment of eligibility[7]. Third, information on food stamp receipt and food insufficiency are for the same month. In other data sets, this information is not available, making assessments of the impact of food stamps on food insufficiency suspect because it not clear, for example, whether a household began receiving food stamps before or after they were food insufficient. Fourth, one of the goals of SIPP is to gather accurate information on income sources and receipt and program participation, especially for the low-income population. This accuracy improves our estimates of the impact of income and food stamps on food insufficiency.

**Econometric Estimation**

We now estimate econometrically the impact of food stamps on the food sufficiency status of households. In the theoretical section, we developed a model where food stamp eligible households simultaneously choose their participation status and their food consumption level and, in the process, their food sufficiency status. In this model, a households' assessment of their probability of food insufficiency effects their participation decision and vice-versa. To accurately incorporate these effects we use a simultaneous equation model with two probits.

This model is estimated as follows (taken from the more general model of Madalla, 1983, p. 246-7). There are two outcomes of interest:

FSP=1 if FSP* > 0, 0 otherwise

FI=1 if FI* > 0, 0 otherwise

The reduced forms of these are

[7]There are some limitations with SIPP in terms of net income and asset eligibility criteria. The main problem is that information on net income is not compiled in the same month as gross income in all cases (e.g. child care expenses are from a different wave). In terms of assets, a similar problem emerges but here, asset information is gathered in the four months after the food insufficiency question was asked.

$FSP^* = \beta_1 X + \gamma_1$,

$FI^* = \beta_2 X + \gamma_2$,

where FSP =1 if a household participates in the program, 0 otherwise; FI=1 if a household is food insufficient, 0 otherwise; **X** is a vector of explanatory variables; $\beta_1$ and $\beta_2$ are vectors of the corresponding parameter estimates; and $\gamma_1$ and $\gamma_2$ are error terms. The reduced forms are estimated by probit MLE and the dependent variables, FSP* and FI* are then estimated using the linear functions. These linear functions are then used in the following structural equations:

$FSP^{**} = \delta_{FI} FI^* + \alpha_1 X_1 + u_1$,

$FI^{**} = \delta_{FS} FS^* + \alpha_2 X_2 + u_2$,

where $X_1 \subset X$, $X_2 \subset X$, and $X_1 \cap X_2$; $\delta_{FI}$, $\delta_{FS}$, $\alpha_1$, and $\alpha_2$ are paramater estimates; and $u_1$ and $u_2$ are error terms. The covariance matrix for the FSP** equation is

$$W_1^{-1}[W_1 - W_3 W_2^{-1} W_4 - W_4' W_2^{-1} W_3' + W_3 W_2^{-1} W_3'] W_1^{-1}$$

where

$$W_1 = \frac{1}{N} \sum_1^N A_{FS} ZZ)$$

$$W_2 = \frac{1}{N} \sum_1^N A_{FI} XX)$$

$$W_3 = \frac{1}{N} \sum_1^N A_{FS} \delta_{FS} ZX)$$

$$W_4 = \frac{1}{N} \sum_1^N a_{FS} a_{FI} E[(FSP - \mu_{FS})(FI - \mu_{FI})] XZ)$$

$$Z' \begin{bmatrix} \$_2^{(} X \\ X \end{bmatrix}$$

$$a_{FS}' \frac{N_{FS}}{M_{FS}(1\&M_{FS})}$$

$$a_{FI}' \frac{N_{FI}}{M_{FI}(1\&M_{FI})}$$

$A_{FS}=N_{FS}a_{FS}$

$A_{FI}=N_{FI}a_{FI}$

The covariance matrix for the FI** equation is the same expression with a reversal of the subscripts in the definitions of Z, $W_1$, $W_2$, $W_3$, and $W_4$.

Households in our sample fall into one of four mutually exclusive categories: 38.7 percent are food sufficient and in the program; 3.6 percent are food insufficient and in the program; 56.0 percent are food sufficient and not in the program; and 2.3 percent are food insufficient and not in the program. To explain why households fell into these categories, the following explanatory variables in the food stamp participation equation are used: the EFSB; income in the current month; the homeownership status; the race/ethnicity of the household head; the marital status of the household head and whether children are present; the presence of children in the household; the high school graduation status of the household head; the senior status of the household head; whether a household receives transfers in the form of Aid to Families with Dependent Children (AFDC) or Supplemental Security Income (SSI); and the employment status of the household head.

Along with the effect of food insufficiency on participation, the EFSB variable is of primary interest in this equation. Increases in EFSB should produce increases in participation rates. The other variables are used to control for demographic differences; income differences not reflected in current income; differences in stigma of participation; and differences in time costs associated with joining the program. We cite five examples of how stigma and time cost differences may be reflected in the variables. One, households with children face more constraints in terms of applying for food stamps. Two, these same households may face less stigma costs because children are "more worthy" recipients of food assistance. Three, areas with high concentrations of poverty may be more likely to have a nearby food stamp office and/or recipients may be able to avoid the stigma of purchasing food with food stamps by going to food stores outside the area if they are in metropolitan areas, as they often are. Moreover, in areas with concentrated poverty, recipients may feel less stigmatized because their neighbors also recognize the need for food stamps. In comparison to whites, poor non-Hispanic blacks and Hispanics are more likely to live in areas with concentrated poverty (Jargowsky, 1997). Thus, race/ethnicity is used as a rough proxy for areas with concentrated poverty. Four, conversely, homeowners may live in a slightly wealthier area then renters and would face greater stigma in using food stamps. Five, high school graduates may take less time to navigate the food stamp enrollment process than non-graduates making them more likely to enroll.

For the food sufficiency probit, we use the same variables as the participation probit with the addition of disability status of the household head and the subtraction of EFSB. These are similar to those used to explain food insufficiency in other studies (Rose, Gundersen, and Oliveira,

1998).

Because the reasons for why these variables may effect food insufficiency is not always apparent, justifications for a selection of these variables follow. Income has a direct effect (more income means more money for food) and an indirect effect (low income can inhibit transportation to the food store). For purposes here, high school graduate proxies for improved allocative efficiency in household production. Homeownership has at least two possible effects: A subset of homeowners, those with paid-off mortgages, have more disposable income and it may proxy for greater efficiency in the allocation of household resources (Mayer and Jencks, 1989). Single parents with children do not have the benefit of a spouse's non-market labor (e.g., dishwashing, cooking) that would allow for more time in shopping and preparing food which as a result may lead to a substitution of more expensive already-prepared food for cheaper more basic foods. Children in the household increases the number of mouths to feed and entails other additional expenses (e.g. child care) not present in childless households. For seniors, food energy needs are decreased in the elderly and physical sensations, such as hunger, may not be as strong, which may lead to food insufficiency rates (Rolls, 1993). Disabled households face difficulties in getting to food stores and face demands on their income not faced by non-disabled households (e.g. certain medical expenses). Of particular interest in this equation is the effect of food stamp participation on food insufficiency.

**Results**

The results of the econometric model are in Table 3. The food stamp participation probit's estimated coefficients for the simultaneous equation model are in column 1. Households with

higher probabilities of food insufficiency (i.e. households with a value of 1 for FI*) are much more likely to join the food stamp program. In comparison to predicted food sufficient households, predicted food insufficient households are 12.9 percent more likely to participate. This is one indication that the program is effectively targeting participation among those most in need of assistance. It is also an indication of adverse selection: the effect of food stamps on food insufficiency will be lower because the worst-off households are joining the program. The importance of estimating the participation and food insufficiency outcomes simultaneously, in terms of the determinants of participation, can be seen in a comparison of columns 1 and 3. Column 3 has the estimated coefficients for a univariate probit with the same variables and a food insufficiency variable (in this case, food insufficient households as opposed to predicted food insufficient households). As measured by the z-statistic, income, homeownership, senior status, and transfer recipiency become distinctly less important to the participation decision once the probability of food insufficiency is controlled for. For example, for seniors, their lower participation rates are due to lower probabilities of food insufficiency.

After taking into consideration the effect of food insufficiency, most of the variables are of the expected sign and significance. All else equal, higher expected benefits induce higher participation rates; homeowners, high school graduates, and employed persons are less likely to participate; and non-Hispanic black households, single parents with children, households with children, and transfer recipients are more likely to participate.

The results from the food insufficiency probit are in column 2. When estimated in a simultaneous equation framework, food stamp participation has a small impact on a household's

probability of food insufficiency. In comparison to predicted non-participants, predicted participants are only .6 percent less likely to be food insufficient. Reasons for the low value are discussed below in the policy simulations. Analyses which do not take into consideration the simultaneity of the participation and food insufficiency outcomes, however, would find that food stamp participation actually produces an increase in the probability of food insufficiency. This can be seen in terms of the coefficient on food stamp participation in column 4.

When significant, the other variables in our model have the expected signs: homeowners, seniors, and non-Hispanic black households have lower probabilities of food insufficiency and households with a disabled person have higher probabilities. Increases in income do produce declines in the probability of food insufficiency, as expected, but this result is insignificant.

To simulate a possible policy intervention to reduce the number of food insufficient households and to produce a better picture of the effect of coefficients in our model, we consider a 10 percent increase in expected food stamp benefits. To calculate this scenario, two factors must be considered: (1) the influence of the increase on the participation rate and (2) the influence of the increase on the percentage of food insufficient households. Out of the sample of eligible households, the ten percent increase in EFSB will lead to a .05 percent decline in the number of food insufficient households.

This is an understatement of the effect of food stamps on food insufficiency due to the presence of adverse selection found in our model. As discussed above, households with a greater propensity towards food insufficiency have a higher probability of entering the program. Insofar as households at greater risk for food insufficiency also have unobserved characteristics which

make them both likely to be participants and food insufficient, the effect of food stamps will be mitigated. For example, households which know they have lower consumption management skills (putting them in greater danger of food insufficiency) may be more likely to participate in order to offset budgeting mistakes. Or, for example, the unobserved way households enter the program may be correlated with an *a-priori* disposition towards food insufficiency. Approximately 10 percent of caseload growth in food stamps from 1987 to 1995 can be attributed to expansions in Medicaid (Yellowitz, 1996). Insofar as households enroll in Medicaid due to ill health and ill health is a cause of food insufficiency, this could be another reason for the low coefficient on predicted food stamp participation.

**Conclusion**

An important goal of the Food Stamp program is the enhancement of food sufficiency in the United States. Using a univariate probit model, one finds that participation in the Food Stamp Program is associated with a slightly increased probability of being food insufficient. However, this finding is biased if households more likely to participate in the Food Stamp Program are also more likely to be food insufficient. In order to account for this possible problem of endogeneity, we use a simultaneous equation model with two probits to estimate simultaneously the impact of participation on the food sufficiency status of households and the impact of food insufficiency on the probability of participating in the program. Results from this model show that households with a higher probability of food insufficiency households do have a substantially higher probability of participation. This is one indication that the program is effectively targeting those most in need of assistance. It also suggests that there is a problem of adverse selection and,

therefore, the finding in this paper of a small decrease in the effect of food stamp participation on a household's probability of being food insufficient is an understatement of the true effect of food stamps. Future research on the impact of food stamps on food insufficiency should include efforts to control for this problem of adverse selection.

## Table 1

## Means and Standard Deviations of Selected Variables for Food Stamp Participation Categories[1]

| Variables[2] | Eligible Food Stamp Recipients | Eligible Non-Food Stamp Recipients | All Food Stamp Recipients[3] |
|---|---|---|---|
| | mean (st. dev.) | mean (st. dev.) | mean (st. dev.) |
| Expected food stamp benefits ($) (household) | 179.65 (136.44) | 96.20 (102.34) | 174.23 (135.24) |
| Actual food stamp benefits ($) (household) | 176.22 (128.53) | - | 175.79 (127.62) |
| Actual minus expected food stamp benefits ($) | -3.44 (85.528) | - | 1.56 (89.23) |
| Total income ($) (household) | 761.03 (680.00) | 852.52 (766.87) | 1,019.28 (1,065.62) |
| Homeowner | .25 | .50 | .30 |
| Non-Hispanic Black | .33 | .17 | .31 |
| Hispanic | .19 | .13 | .19 |
| Non-Hispanic Other | .02 | .02 | .03 |
| Single parent with child | .47 | .10 | .45 |
| Child present | .66 | .30 | .68 |
| High school graduate | .47 | .51 | .50 |
| Senior in household | .26 | .51 | .25 |
| Transfer Recipient | .65 | .12 | .60 |
| Employed person in household | .31 | .40 | .40 |
| Disabled person in household | .35 | .27 | .37 |
| Food insufficient | .09 | .04 | .08 |
| Unweighted number of households | 1,424 | 2,028 | 1,906 |

[1] The values are computed using the household weights in the final month of wave 3 of the 1991 panel and wave 6 of the 1992 panel.

[2] Except where otherwise indicated, the variables refer to the current month and the household head.

[3]This category includes both eligible and seemingly ineligible households.

## Table 2

## Means and Standard Deviations of Selected Variables for Food Insufficiency Categories[1]

| Variables[2] | Food Sufficient Households | Food Insufficient Households |
|---|---|---|
| | mean<br>(st. dev.) | mean<br>(st. dev.) |
| Expected food stamp benefits ($)<br>(household) | 128.32<br>(124.75) | 168.67<br>(115.66) |
| Actual food stamp benefits ($)<br>(household) | 70.87<br>(119.24) | 104.69<br>(123.94) |
| Actual food stamp benefits ($)<br>(household)(food stamp recipients) | 175.82<br>(130.34) | 180.45<br>(108.15) |
| Actual minus expected food stamp benefits[2] | -2.36<br>(83.16) | -16.31<br>(90.06) |
| Total monthly income ($)<br>(household) | 817.842<br>(744.70) | 765.75<br>(552.83) |
| Homeowner | .41 | .26 |
| Non-Hispanic Black | .24 | .22 |
| Hispanic | .15 | .17 |
| Non-Hispanic Other | .02 | .02 |
| Single parent with child | .24 | .41 |
| Child present | .43 | .65 |
| High school graduate | .49 | .55 |
| Senior in household | .42 | .16 |
| Transfer Recipient | .49 | .50 |
| Employed person in household | .42 | .39 |
| Disabled person in household | .30 | .41 |
| Food stamp recipient | .40 | .58 |
| Unweighted number of households | 3,248 | 204 |

[1] The values are computed using the household weights in the final month of wave 3 of the 1991 panel and wave 6 of the 1992 panel.
[2] Except where otherwise indicated, the variables refer to the current month and the household head.
[3] This is calculated for households receiving food stamps.

## Table 3

## Food Stamp Participation and Food Insufficiency Probit Equations

| | Simultaneous Equations | | Independent Equations | |
|---|---|---|---|---|
| | Food Stamp Participation[1] | Food Insufficiency[2] | Food Stamp Participation[1] | Food Insufficiency[2] |
| Variables[3] | Coef. (z-stat.) | Coef. (z-stat.) | Coef. (z-stat.) | Coef. (z-stat.) |
| Estimated food insufficient (household) | .644<br>(2.781) | | | |
| Actual food insufficient (household) | | | .127<br>(1.166) | |
| Estimated food stamp participant (household) | | -.0900<br>(-.473) | | |
| Actual food stamp participant (household) | | | | .120<br>(1.309) |
| Expected food stamp benefits (household) | .00210<br>(5.875) | | .196<br>(6.583) | |
| Total income (household) | .0000007<br>(.012) | -.00014<br>(-1.643) | -.000717<br>(-1.723) | -.00012<br>(-1.538) |
| Homeowner | -.223<br>(-3.009) | -.210<br>(-2.013) | -.325<br>(-5.982) | -.170<br>(-2.041) |
| Non-Hispanic Black | .334<br>(3.441) | -.226<br>(-2.125) | .176<br>(2.683) | -.253<br>(-2.641) |
| Hispanic | .189<br>(.192) | -.142<br>(-1.337) | -.080<br>(-1.038) | -.140<br>(-1.319) |
| Non-Hispanic Other | -.455<br>(-.242) | -.0856<br>(-.389) | -.088<br>(-.539) | -.091<br>(-.416) |
| Single parent with child | .368<br>(3.655) | .149<br>(1.182) | .415<br>(5.032) | .109<br>(1.039) |
| Child present | .282<br>(2.348) | .224<br>(1.220) | .378<br>(3.911) | .128<br>(1.122) |
| High school graduate | -.157<br>(-2.351) | -.0226<br>(-.262) | -.172<br>(-3.041) | -.00184<br>(-.024) |
| | Food Stamp Participation | Food Insufficiency | Food Stamp Participation | Food Insufficiency |

| | Simultaneous Equations | | Independent Equations | |
|---|---|---|---|---|
| Variables | Coef. (z-stat.) | Coef. (z-stat.) | Coef. (z-stat.) | Coef. (z-stat.) |
| Senior in household | .111<br>(.725) | -.478<br>(-3.854) | -.232<br>(-3.156) | -.449<br>(-4.115) |
| Transfer recipient | 1.155<br>(12.379) | .341<br>(1.281) | 1.331<br>(22.440) | .172<br>(1.838) |
| Employed person in household | -.289<br>(-3.408) | -.188<br>(-.017) | -.292<br>(-4.130) | .0310<br>(.327) |
| Disabled person in household | | .307<br>(3.632) | | .285<br>(3.696) |
| Constant | .130<br>(.398) | -1.561<br>(-9.357) | -.748<br>(-8.913) | -1.542<br>(-12.829) |

[1] Food stamp participation is equal to 1 if the household participates in the Food Stamp Program; 0 otherwise.

[2] Food insufficiency is equal to 1 if the household is food insufficient, 0 otherwise.

[3] Except where otherwise indicated, the variables refer to the current month and the household head.

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