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FOOD STAMP PROGRAM PARTICIPATION
AND CASH EQUIVALENT BENEFITS

by

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FOREWORD

ABSTRACT

In the policy debate surrounding the development of the Food and Agriculture Act of 1977 the question of whether the Food Stamp Program (FSP) would be transformed into a quasi-cash transfer program by the elimination of the purchase requirement (EPR) was posed. To address that question this study investigates the extent to which food stamps are equivalent to cash for post-EPR FSP eligible households. The purpose of this study is to determine the extent to which food stamps are cash equivalent and to determine which program and household characteristics, including the degree of cash equivalence, affect Food Stamp Program participation. A probit participation equation is specified as a function of economic incentive variables and household characteristics assumed to be associated with household prestige and privacy. Calculation of the extent to which stamps are cash equivalent based on the estimation results indicate that stamps are on average virtually equivalent to cash in utility.

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Introduction

The Food and Agricultural Act of 1977 introduced many changes
in the Food Stamp Program (FSP). The most profound structural program
change was the elimination of the purchase requirement (EPR). Under
the previous program regulations the purchase requirement was the
amount the family had to pay to receive its full allotment of food
stamps each month. The payment amount was based upon "ability to
pay" determined according to family size and income. The full
monthly allotment of stamps was set by the USDA according to the
cost of a nutritionally adequate diet, the Thrifty Food Plan, for
particular family sizes. For example, if it was determined that a
household should spend $120 per month for food, yet could only
afford $40, thirty percent of its adjusted income, the purchase
requirement would be set at $40. This household would pay that
amount and receive $120 in food coupons. The difference of $80 was
the Federal subsidy, the bonus. Families were given the choice of
paying one-quarter, one-half, or three-quarters of the purchase
requirement in exchange for the same fraction of their total allot-
ment in a given month. Elimination of the purchase requirement
meant that, effective January 1, 1979, the household received only
the bonus stamps and paid nothing for them. EPR was expected to
increase participation because the cash outlay, thought to be a
major barrier to participation, was no longer required.

The elimination of the purchase requirement was the most hotly
debated reform enacted in 1977. Opponents argued that,

> . . . EPR would run contrary to the purpose of the food
> stamp program and turn it into a straight welfare pro-
> gram, with little if any affect on the nutritional status
> of recipients.[1]

This argument was based upon the fact that all households, whether
their purchase requirement was or was not zero under the old regula-
tions, would receive only bonus stamps under the new regulations.
In the example given previously, the household would receive $80 in
food coupons instead of $120. The major concern to the opponents of
EPR was that there would be no way to ensure that households such as
these would spend at least $120, or their total pre-EPR allotment, on
food. Hence, EPR, represented an unwanted, quasi-cash transfer pro-
gram. Proponents argued that the purpose of EPR was to increase
participation by eligible households, not to create a quasi-cash
transfer program.

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1. U.S. Congress, House, Food Stamp Act of 1977, H. Rept. 95-464 to
   Accompany H. R. 7940, 95th Cong., 1st sess., 1977, p. 239.

The question of whether or not the post-EPR Food Stamp Program is a quasi-cash transfer program can be translated into the following empirical question. To what degree are food stamps equivalent to cash for Food Stamp Program eligible households? The purpose of this study is to determine the extent to which food stamps are cash equivalent and to determine which program and household characteristics, including the degree of cash equivalence, affect Food Stamp Program participation. A theoretical framework for eligible households' Food Stamp Program participation decisions is outlined in the first section of this paper followed by specification of the probit participation equation. The final section includes a presentation of the probit estimates, calculations of the extent to which the food stamps are cash equivalent, and conclusions.

Theoretical Framework

The theoretical framework for eligible households' Food Stamp Program participation decisions is a modification of the one developed by Lane, Kushman, and Ranney (1983) and is described in detail in Ranney (1983). An outline is presented herein.

The eligible household is hypothesized to maximize utility

$$u = U(G,F,S,R,X) \tag{1}$$

where F is food bought with cash, S is food bought with stamps, G is a composite of all other goods, R is a composite of prestige and privacy, and X is a vector of household characteristics. The household maximizes utility subject to a cash income constraint

$$P_F F + P_G G \leqq Y, \tag{2}$$

a stamp allotment constraint

$$P_F S \leqq A, \tag{3}$$

and the production of household prestige and privacy

$$R = R(S,X,d). \tag{4}$$

In (2) and (3), P_F and P_G are prices, Y is cash income, and A is the household's allotment of food stamps. In (4), d is one if the household participates in the FSP and zero if it does not. The production of household prestige and privacy is such that $R(S,X,d = 1) \leqq R(S,X,d = 0)$ and $R_S \leqq 0$.[1] The inequality represents the notion that households may be stigmatized when undertaking activities associated with participation. The derivative R_S represents possible marginal stigma associated with stamp use. The household characteristics in X may affect utility directly through (1) or indirectly through (4) the production of household prestige and privacy.

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[2]Subscripts are used to denote partial derivatives, except for prices.

The eligible household makes its FSP participation decision by comparing the maximum utility possible given participation with the maximum possible given nonparticipation and chooses the participation status that yields the highest maximum utility. The indirect utility function represents the maximum utility attainable. The indirect utility function is obtained by constructing the appropriate Lagrangian function and associated first order conditions, simultaneously solving those first order conditions under certain assumptions, and substituting the resulting demand functions into (1). Nonsatiety, an interior solution, and exhaustion of the stamp allotment are assumed such that $G > 0$, $F + S > 0$, and $S = A/P_F$. The resulting indirect utility function is

$$u = V(P_G, P_F, Y, A, X, d). \tag{5}$$

The participation decision can be represented by the ratio of the household's participating indirect utility function V_P and its nonparticipating indirect utility function V_{NP} such that

$$D = \frac{V_P(P_G, P_F, Y, A, X, d = 1)}{V_{NP}(P_G, P_F, Y, A = 0, X, d = 0)}. \tag{6}$$

If $D \geq 1$ the household participates in the Food Stamp Program and if $D < 1$ it will not.

Empirical Specification

The theoretical model outlined above provides the framework for specifying a probit equation for post-EPR Food Stamp Program participation decisions of eligible households. The analysis in this study is based on survey data regarding eight hundred ninety-six households eligible for food stamps. The households were interviewed between July 1979 and May 1980.

A number of assumptions are adopted for this study. Resale of stamps and purchases of nonfood goods or services with stamps are assumed to be negligible. It is also assumed that there are no lump-sum monetary access costs associated with program participation. Finally, aside from stigma effects, stamps may not be fully cash equivalent for some households. That is, holding all else constant, including prestige and privacy, a household's subjective evaluation of the stamp allotment may be less than its actual market value or food purchasing power. This subjective evaluation, in turn, may affect the program participation decision.

Smeeding (1982) reports that empirical evidence indicates most in-kind transfer recipients would prefer cash transfers of equal value. Empirical studies of food stamp in-kind transfers by Cooper and Katz (1978), Clarkson (1976), MacDonald (1977), Murray (1975 and 1980), Plotnick and Smeeding (1979), Smeeding (1975), and Smolensky, et al. (1977) yield estimated cash equivalent values that span 83 to 96 percent of actual market values. All of those studies were based upon pre-EPR data and Food Stamp Program regulations. Smeeding (1975a), however, estimated cash equivalent values under a simulated

FSP without a purchase requirement. He found cash equivalent values of 97 percent of stamp allotment market values. Cash equivalent values of food stamp allotments have yet to be estimated from post-EPR data.

Variables hypothesized to effect the degree to which household allotments are cash equivalent will be included in estimating the determinants of Food Stamp Program participation given post-EPR survey data. Eligible households' cash equivalent stamp allotments can be calculated from the estimated parameters of the probit participation equation.

Let V be the indirect utility function for a representative member of a households eligible for the Food Stamp Program with

$$V = K[(y/P) + (a/P)C]^B Te^u. \tag{7}$$

In (7), let

$$K = e^{\sum_j b_j h_j}$$

where the h_j are household characteristics that
to affect indirect utility directly and the
b_j are the coefficients associated with those characteristics.

y = total income per index person;[3]

a = face value of the food stamp allotment per index person;

P = all items price index;

C = the extent to which the food stamp allotment is cash equivalent, $0 \leq C \leq 1$;

$T = e^{\sum_r b_r h_r}$, when the household participates,
where the h_r household characteristics are assumed to
affect indirect utility through prestige and privacy, and
= 1 if the household does not participate,

B = a parameter;

and

u = an error term.

Define the error term as

$$u = \delta u_p + (1 - \delta)u_{NP} \tag{8a}$$

where

δ = 1 if the household is participating and $\qquad$ (8b)

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[3]The method utilized for calculating total income and for obtaining the index person adjustment are described in Ranney (1983).

$= 0$ otherwise;

$$E(u) = E(u_p) = 0 \text{ if } \delta = 1 \text{ and} \tag{8c}$$

$$= E(u_{NP}) = 0 \text{ if } \delta = 0; \text{ and}$$

$$Var(u) = Var(u_p) = \sigma_p^2 \text{ if } \delta = 1 \text{ and} \tag{8d}$$

$$= Var(u_{NP}) = \sigma_{NP}^2 \text{ if } \delta = 0.$$

If the household participates in the Food Stamp Program, then (7) in (6) becomes

$$V_p = e^{\Sigma b_j h_j}[(y/P) + (a/P)C]^B e^{\Sigma b_r h_r} e^{u_p}. \tag{9}$$

If the household does not participate, $a = 0$, $T = 1$, $u = u_{NP}$, and (7) becomes

$$V_{NP} = e^{\Sigma b_j h_j}[y/P]^B e^{u_{NP}}. \tag{10}$$

Equations (9) and (10) are the empirical counterparts of the components of the theoretical participation function (6). Substituting (9) and (10) into (6) and assuming indirect utility is always positive. A logarithmic transformation of the resulting expression yields

$$\ln D = B\ln[(y/P) + (a/P)C] - B\ln(y/P) + \Sigma b_r h_r + u^* \tag{11}$$

where

$$u^* = u_p - u_{NP}. \tag{12a}$$

Equation (11) is our empirical participation equation. In (11) u* is defined such that from (8c)

$$E(u^*) = E(u_p) - E(u_{NP}) = 0 \tag{12b}$$

and from (8d)

$$var(u^*) - \sigma_p^2 + \sigma_{NP}^2 + 2cov(u_p, u_{NP}). \tag{12c}$$

The final specification for (11) depends upon the definitions of D, C, and $\Sigma b_r h_r$.

The extent to which the allotment is cash equivalent (C) is defined as a logistic function,

$$C = \frac{1}{1 + e^{-c'x}} \tag{13}$$

where c_l are parameters associated with x_l variables assumed to affect the degree of cash equivalency. The logistic function is bounded by zero and one.[4] As c'x approaches negative infinity, C

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[4]See Pindyck and Rubinfeld, Econometric Models and Econometric Forecasts, (1976), p. 247.

in (11) approaches zero. In this extreme case $(a/P)C$ approaches zero and the bracked term in (11), $[y/P]$. Given participation and free disposal, therefore, stamps would be valueless and contribute nothing to total resources. Stamps would be perfectly noncash equivalent. At the other extreme, as $c'x$ approaches positive infinity, C approaches 1. As stamps approach cash equivalency, the proportion of real allotment per index person that would be needed as a cash transfer to increase utility as much as stamps with value "a" dollars approaches one.

Define $c'x$ in (13) as

$$c'x = c_1(y + a) + c_2(P_F/P_G) + c_3(\frac{a}{y + a}).$$ (14)

The c_1 are parameters associated with total nominal resources, the price of food (P_F) relative to the price all other goods (P_G), and the share of total resources that is constrained to food purchases, respectively. Substitute (13) into (11) to obtain

$$\ln D = B\ln[\frac{y}{P} + \frac{a}{P}(\frac{1}{1 + e^{-c'x}})] - B\ln(\frac{y}{P}) + \Sigma b_r h_r + u*.$$ (15)

Although the logarithm of the bracketed term in (15) cannot be further broken down, a Maclaurin approximation can be used to obtain a useful approximation.

The general form for our first order Maclaurin series evaluated at $c = 0$ is

$$f(c) \approx f(0) + c_1 f_{c_1} + c_2 f_{c_2} + c_3 f_{c_3}$$ (16)

where

$$f(c) = \ln[\frac{y}{P} + \frac{a}{P}(\frac{1}{1 + e^{-c'x}})].$$ (17)

After deriving the specific series for this case, that series is substituted into (15) to yield

$$\ln D = B(CE_0) + (Bc_1)(CE_1) + (Bc_2)CE_2 + (Bc_3)CE_3 + \Sigma b_r c_r + u*$$ (18)

where

$$CE_0 = \ln[y/P + a/2P] - \ln(y/P),$$

$$CE_1 = Z(y/P + a/2P),$$

$$CE_2 = Z(P_F/P_G),$$

$$CE_3 = Z(\frac{a}{y + a}), \text{ and}$$

$$Z = (\frac{a}{4P})(\frac{1}{y + a/2P}).$$

What may we hypothesize regarding the signs of the CE coefficients in (18), B, Bc_1, Bc_2, and Bc_3 respectively? Since the first coefficient, B is the exponent of total resources for the indirect utility function more simply defined in (7), B should be greater than zero. The signs of Bc_1, Bc_2, and Bc_3, therefore, will depend upon the signs of c_1, c_2, and c_3, respectively. Consider the derivative of C with respect to any x_i,

$$C_{x_i} = \frac{e^{-c'x} c_i}{(1 + e^{-c'x})^2}.$$ (19)

Since

$$\frac{e^{-c'x}}{(1 + e^{-c'x})^2} > 0,$$

(19) must have the sign of c_i. Recall that x_1, x_2, and x_3, defined in (14), are the determinants of the extent to which stamps are cash equivalent. Stamps will be closer to being cash equivalent the less burdensome the household finds restricting part of its resources to food purchases. This "burden", all other things constant, may be (1) greater, the higher the household's nominal resource level $(y + a)$, because households with higher resource levels, if unrestricted, would spend a smaller proportion of income on food, i.e., $c_1 < 0$; (2) less, the higher the relative price of food, since more of the budget would be spent on food anyway, i.e., $c_2 > 0$; and (3) greater, the larger the share of income constrained to food purchases; i.e., $c_3 < 0$. Given this development of the cash-equivalency variables in (18), only ln T on the left hand side of that equation requires clarification.

Recall that there are two functions of household characteristics defined for the indirect utility function in (7), T and K. The characteristics to be included in K (h_j) are those that affect utility directly, whether or not the household participates in the program. This is not the case for T, however. That is, T is defined as a function of household characteristics (h_r) affecting utility only when the household participates, because they determine household prestige and privacy levels. The privacy and prestige level is defined to equal 1 when the household does not participate. Consequently, when V_p (9) and V^{NP} (10) are transformed logarithmically and differenced as in (11) ln K = $\Sigma b_j h_j$ drops out of the participation equation while ln T = $\Sigma b_r h_r$ does not.

For our empirical specification, we do not know a priori which household characteristics belong in K and T, respectively. That is, we do not know which household characteristics should be excluded from the participation equation because they effect utility in the same way regardless of participation status and do not enter into the participation choice. Neither do we know which characteristics should be included in the participation equation due to their effect on prestige and privacy associated with program participation, through T. On an intuitive basis, however, some household characteristics are "better candidates" to determine the prestige and privacy effects of

Food Stamp participation than others. These characteristics are designated, as belonging in ln T. The variables that are considered the most intuitively plausible candidates for the participation equation are defined in Table 1.

Participation in food and public assistance programs may suggest that household prestige or privacy considerations may not be as important as for households that do not so participate. If so, the effects of h_1(FA) and h_5(PA) may be related positively to FSP partici- pation. If a households' neighbors, friends, or relatives participate in the FSP experienced prestige or privacy loss may be less than for the households where such is not the case. Thus, the participation decision may be related positively to h_2(HOOD). Well-established homeowners may feel more stigmatized by program participation. Thus, h_3(OWN) may be related negatively to participation. Such a negative relationship may also exist for h_4(EHRS), since households with strong labor force attachments may experience relatively greater prestige losses due to participation than those with weaker labor force attachments. The remainder of the variables represent possible regional differences in program administration or other unspecified regional characteristics that may affect households prestige or privacy levels. No expectations regarding the signs for these regional dummy variables have been formulated.

The dependent variable in (18), ln D, remains to be specified. We do not observe that variable for each household, but we do observe the participation decision which can be represented as a binary or zero-one variable, PART. If ln D $>$ 0, then the household participates and PART = 1. If ln D $\leq$ 0, the household does not participate and PART = 0.

Given a dichotomous dependent variable, probit analysis is used to estimate the probability that a household participates in the Food Stamp Program. The means and standard deviations for all vari- ables used to estimate the participation equation (18) including PART as the dependent variable are presented in Table 2.

Results, Cash Equivalence, and Conclusions

Estimates for the probit participation equation are presented in Table 3. Among the "economic incentive" variables (CE_0, CE_1, CE_2, and CE_3) all but CE_1 are highly significant. Variable CE_1 was omitted from the final form estimated and reported in Table 3 due to its insignificance in preliminary estimation. These terms manifest both the attraction of the allotment as an increase in purchasing power and the noncash-equivalency that results from constraining the transfer to be spent on food. All of the statistically insignificant terms have coefficients with the anticipated signs.

Using the participation equation results it is possible to compute the extent to which the stamp allotment is cash equivalent, C in the model. The calculation was made for 835 cases in the sample. The mean was approximately 0.96 or 96 percent cash equivalent. In other words, a cash grant would have to be, on average, 96 percent

Table 1

Household Characteristics (h_r)

h_1 = participation in other food programs (FA)
= 1 if any member of the household participates in school lunch or breakfast programs, Meal for the Elderly, EFNEP, or WIC and
= 0 otherwise.[5]

h_2 = neighborhood effects (HOOD)
= 1 if friends, neighbors, or relatives of any household member receive food stamps and
= 0 otherwise.

h_3 = homeownership (OWN)
= 1 if the residence is owned by the household and
= 0 otherwise.

h_4 = Number of hours worked last week by the principal earner (EHRS)[6]

h_5 = participation in public assistance programs (PA)
= 1 if any member of the household receives public assistance in the forms of AFDC or GA and
= 0 otherwise.[7]

h_6 = Age of household head (HAGE)

h_7 = (VM)
= 1 if the household is located in the metropolitan county in Virginia and
= 0 otherwise.

h_8 = (VNM)
= 1 if the household is located in the nonmetropolitan county in Virginia and
= 0 otherwise.

h_9 = (OM)
= 1 if the household is located in the metropolitan county in Ohio and
= 0 otherwise.

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[5]EFNEP represents the Expanded Food and Nutrition Education Program. WIC represents the Women and Infant Care Program.

[6]The principal earner is defined to be the household member who earned the most income over the previous two-month period.

[7]AFDC represents Aid to Families with Dependent Children. GA represents General Assistance.

Table 1 (continued)

h_{10} = (ONM)
= 1 if the household is located in the nonmetro-
politan county in Ohio and
= 0 otherwise.

h_{11} = (IM)
= 1 if the household is located in the metro-
politan county in Indiana and
= 0 otherwise.

h_{12} = (INM)
= 1 if the household is located in the nonmetro-
politan county in Indiana and
= 0 otherwise.

h_{13} = (CAM)
= 1 if the household is located in the metro-
politan county in California and
= 0 otherwise.[8]

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[8]The omitted category is the nonmetropolitan
Californians.

Table 2

Means and Standard Deviations of Variables Used for Estimating The
Participation Equation*

Variable	Mean	Standard Deviation
PART	.46657	.49926
CE_0	.12455	.23454
CE_1	14.07800	12.29700
CE_2	.05379	.05984
CE_3	.07505	.04015
FA	.22948	.42082
HOOD	.62006	.48574
EHRS	13.83300	19.65700
OWN	.32219	.46767
PA	.32219	.46767
HAGE	43.74200	19.24300
VM	.11702	.32169
VNM	.15653	.36364
OM	.09423	.29236
ONM	.08511	.27925
IM	.13526	.34226
INM	.13222	.33899
CAM	.15653	.36354

*Sample size = 658

Table 3

Participation Estimation Results: Probit Coefficients and Standard Errors

Variable	Coefficient (Standard Error)*
CONSTANT	-1.0351^{3} (.1743)
CE_0	1.8064^{3} (.4529)
CE_1	--
CE_2	13.7780^{3} (2.8901)
CE_3	-26.1530^{3} (5.3921)
PA	0.6266^{3} (.1444)
OWN	-0.3399^{3} (.1398)
HOOD	0.4539^{3} (.1189)
EHRS	-0.0172^{3} (.0030)
VM	0.1972^{1} (.2186)
VNM	0.3833^{1} (.2203)
OM	0.3255^{2} (.2253)
ONM	0.4970^{2} (.2489)
IM	0.5395^{3} (.2231)
INM	0.0953 (.2145)
CAM	0.2379 (.2011)

* Sample size = 691

1. Significant at ten percent in two-tail test.

2. Significant at five percent in two-tail test.

3. Significant at one percent in two-tail test.

as large as the face value of the food stamp allotment to confer on
the household the same increase in welfare due to command over
market goods and services.

The extent to which the allotment is cash equivalent is, of
course, not uniform among all eligible households. There is,
however, very little dispersion among the calculated values. Only
three percent of the estimated values for C are less than 0.60.
Another four percent are between 0.61 and 0.89. In excess of 92
percent of the sample values are 0.90 or greater. In fact, 84
percent are 0.99 or greater. For the vast majority of eligible
households, then, stamps are estimated to be 99 percent cash
equivalent. Very low values taken by a very few estimates of C
may well be statistical artifacts created by the particular
functional forms chosen in this model. The mean of the estimated
cash-equivalency coefficient is very near the value obtained by
Smeeding (1982, 1975a).

A last but important matter is the results for those household
characteristics that were felt to be related especially to the
effects of participation in the Program on prestige and privacy.
These effects are the nonmarket "stigma" associated with participation.
The variables for participation in public assistance, home ownership,
having friends or relatives who participate, and labor force attach-
ment have the anticipated signs and are highly significant. Their
importance as indicators of sensitivity to the social consequences of
participation is validated. Some of the differences in participation
associated with social sensitivity (the opposite of stigma) might be
removed by restructuring the manner in which certification and stamp
usage are handled. For instance, mailing stamps instead of having
them picked up will reduce the visibility of participation.

Cashing out the program would have different consequences for
participation depending on whether the administration was changed
so as to eliminate or reduce some of the apparent social barriers.
The results for the "stigma" variables point out that while stamps
may be nearly cash equivalent in command over market goods and
services, they will be more or less cash equivalent in terms of
nonmarket goods, like prestige or privacy, depending upon how a
cash program is run.

This study has emphasized the effects on participation of the
extent to which food stamps are cash equivalent and of social
sensitivity. The analysis indicates that stamps are virtually
equivalent to cash in utility. Even though an additional dollar in
cash or stamps will affect utility similarly on average, stamps may
constrain consumption to some extent. The effect of stamps or cash
on food expenditures, therefore, may not be similar. Further research
is currently underway regarding the possibly differential effects of
cash, cash-equivalent food stamps, and noncash-equivalent food stamps
on food expenditures of households participating in the Food Stamp
Program.

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