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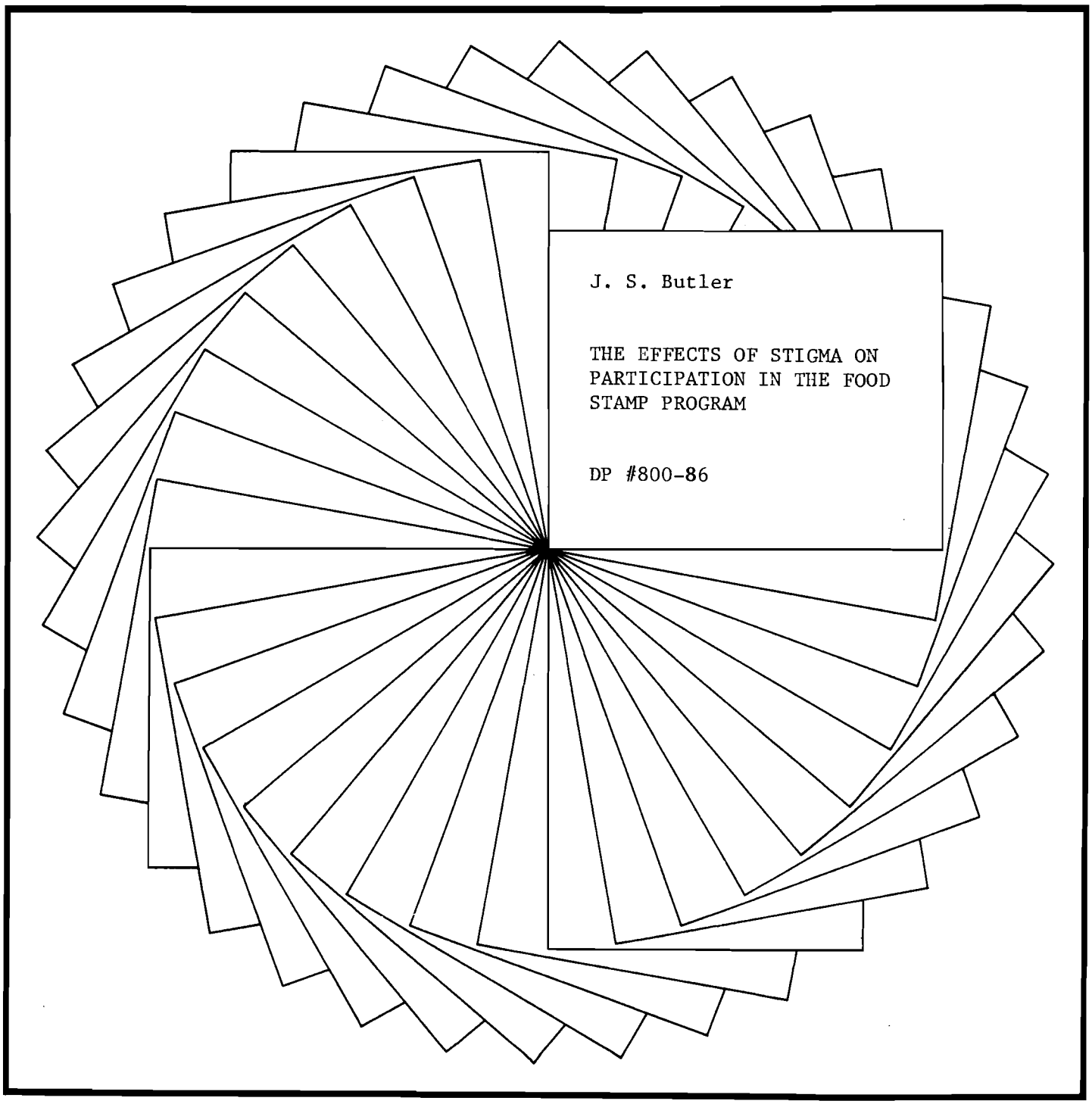

Institute for Research on Poverty
Discussion Paper No. 800-86

THE EFFECTS OF STIGMA ON PARTICIPATION IN THE FOOD STAMP PROGRAM

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March 1986

The author thanks Mathematica Policy Research, Inc., and the Food and Nutrition Service of the U.S. Department of Agriculture for funding, and Jennie Raymond for editing and encouragement. The opinions stated are those of the author and do not necessarily reflect the views of the funding agencies or the Institute for Research on Poverty.

ABSTRACT

Economic theory predicts that all informed, eligible households join welfare programs unless transportation and transaction costs are sufficiently large, or the legal constraints reduce utility. Many eligible households fail to join the Food Stamp program, and the elderly are particularly likely to fail to join. The explicit costs are trivial, and the legal regulations are unlikely to be constraining. Two explanations of the rejection of food stamps by elderly households are considered: stigma (a preference over sources of income, apart from the amounts involved), and problems of mobility (some of the elderly rarely get out of their homes).

The allocation of the budget between food and other goods is not independent of the decision concerning participation. Both are derived from utility maximization and quasi-legal pressures, such as explanations by welfare workers that food stamps are not supposed to be substituted for other sources of food, leading to the failure to substitute in the budget, which lead to greater food expenditures from food stamps than from cash with the same face value.

A utility function expanded to include stigma is used to allocate the budget between food and other goods and decide whether to participate in the Food Stamp program. The parameters vary with demographic characteristics and explain the behavior of 2,052 eligible elderly households from the Food Stamps Cashout Project of the Food and Nutrition Service of the U.S. Department of Agriculture. The equivalent cost of stigma in money is calculated.

1. Introduction

Many eligible persons fail to apply to welfare programs for resources to which they are legally entitled. It must be true that, for these people, there are costs or other factors which make receiving welfare undesirable. Examples are transportation costs, as when quantity restrictions in programs distributing commodities require the recipient to make several trips, and purchase requirements, exchanging cash for coupons of a greater face value which must be used for specific purposes. There are several possible additional explanations for the failure of eligibles to participate: stigma, misinformation, and immobility.

Stigma is the bad feeling or disutility associated with the acceptance of welfare. More generally, stigma is a preference over sources of income independent of the amounts of income involved. Stigma can reflect a desire to take care of oneself, public sentiment against those on welfare, or personal feelings of failure. Even though the existence of welfare stigma is widely accepted, and it apparently interferes with many transfer programs, stigma has rarely been considered explicitly in studies of participation in the programs. In part, that is true because stigma cannot be observed as easily as, for example, income. In this paper, stigma is modelled structurally and inferred from the decisions concerning participation in the Food Stamp program and the allocation of the household budget between food and other goods.

The only explicit costs involved in obtaining food stamps are the purchase requirement, rescinded in 1979, and transportation costs. Both are taken into account here.

Why don't all eligible households get food stamps to sell if not to use for food? A household eligible for food stamps could resell them, albeit illegally. Undertaking such sales requires an aversion to using food stamps legally and a lesser aversion to the illegal activity, which seems unlikely to be true of older people. The amount of the bonus is rarely large enough to make conversion to cash an improvement in terms of buying nonfood items, in any event.

Pure stigma, a preference against food stamps and possibly other income-conditioned transfers, cannot be separated from rejecting restrictions on consumption bundles and on the handling of food stamps. Here, "stigma" refers to the measurable concept, which corresponds to the policy-relevant variable deterring participation by those deemed to be deserving under the rules.

Stigma is assumed to be the major cause of nonparticipation in a welfare program, but it also has effects on the allocation of the budget. Owing to embarrassment or unstated quasi-legal constraints, such as not substituting food stamps for other sources of food, which is legal but discouraged, the allocation of food stamps between food and other goods can be tilted in favor of food. In the absence of any of the special factors, the budget share of food would fall slightly when food stamps are accepted because income itself would rise.

There have been few studies which explicitly included stigma in an econometric model. Sometimes, as the Housing Allowance Study did (Ellickson, 1981), explicit indicators of stigma are used--direct answers to questions about proper government policy or embarrassment at receiving welfare. Moffitt (1983) makes stigma a shift parameter in the utility function; he is especially concerned with labor income. The parameter

reduces the effective amount of the benefit entering the indirect utility function. Plotnick (1981) includes stigma in the utility function, as a dollar cost of welfare related to the amount of welfare received.

Stigma is here an explicit deduction from utility inferred from its observable effects on participation and the budget share of food. Because of the nature of the sample, which consists entirely of poor, elderly persons, labor supply is not considered. The model ultimately explains nonparticipation based on utility maximization, and allows a dollar-equivalent value to be assigned to stigma.

The following sections discuss the effects of the Food Stamp program, the translog utility function, the data, the equations to be estimated, and an application of the estimated equations.

2. The Conventional Effects of the Food Stamp Program

In the absence of stigma, the receipt of food stamps with a purchase requirement may not be attractive to eligible households. If the eligibles place a relatively low valuation on food relative to nonfood (all other goods and services), and if they are spending less than their purchase requirement on food, they may choose not to give up the purchase requirement's worth of other goods to get the allotment's worth of food. Eligibles who are spending more than the allotment on food already will, theoretically, treat their bonus value of stamps (allotment less purchase requirement) as a direct increase in income. Eligibles between these extremes who are spending less than the allotment on food but who feel that trading the purchase requirement for a larger face value of food stamps will make them better off, will participate in the program. Again, this analysis doesn't take stigma into account, and for a program with no purchase requirement it predicts that all eligibles

participate, since additional resources always make a person better off. However, not all eligibles participate in the current program; only 49 percent of the eligible elderly and 63 percent of all eligible persons participate in the Food Stamp program according to the estimates of Beebout and Kendall (1979). For more information concerning the economic analysis summarized above, see Clarkson (1975, 1976), Galatin (1973), Mittelhammer and West (1975), and Salathe (1979).

Numerous studies have shown that food stamps have a greater effect on expenditures for food by household than ordinary income, whether the marginal propensity to consume food or the elasticity of food consumption is considered. (See USDA (1974), Neenan and Davis (1977), Benus, Kmenta, and Shapiro (1976), and U.S.D.A. (1978).) Nevertheless, all these studies suffer from the same major flaw: self-selection into the Food Stamp program. Perhaps those in the program are there because they like food more at the margin of their income, than other persons at that income. That factor probably has some impact, but how much is unknown. The above studies confound, to an unknown extent, unmeasured individual differences with the true effects of food stamps. In this paper, selection bias is controlled by beginning explicitly with a utility function, then deriving equations for participation and expenditures from it.

Using a Cobb-Douglas utility function, Clarkson (1975, 1976) estimates the dollar value of food stamp benefits. The "waste from the recipients' viewpoint" is the difference between the cash they would be willing to pay for food stamps and the value of the stamps in terms of food purchases. Overall, 17 percent of the benefits of food stamps are estimated to be wasted in that sense.

3. The Translog Utility Function

The use of the Cobb-Douglas utility function is somewhat limiting, because it implies that food should take up a constant proportion of the budget. Actually, the budget share falls as income rises; for this reason, a translog utility function is used. The translog indirect utility function is a quadratic Taylor expansion of an arbitrary indirect utility function. The constant is ignored, and with three arguments F (food), N (nonfood), and S (stigma) there are six terms. Indirect utility V is a function of prices P_1 of food and P_2 of nonfood, and income, M_d, including food stamps if they are taken (d=1) and excluding them if not (d=0):

$$\begin{aligned} \ln V_d = {} & a_1 \ln(P_1/M_d) - (1+a_1)\ln(P_2/M_d) - d\exp(-S) + \tfrac{1}{2}b_{11}\ln^2(P_1/M_d) \\ & + \tfrac{1}{2}b_{22}\ln^2(P_2/M_d) + b_{12}\ln(P_1/M_d)\ln(P_2/M_d) - db_{13}\exp(-S)\ln(P_1/M_d) \\ & - db_{23}\exp(-S)\ln(P_2/M_d). \end{aligned} \tag{1}$$

Two normalizations are employed in (1). First, the linear terms add to unity, and the coefficient of S^2 is zero. Both follow from the theory of the translog utility function (see Christensen, Jorgenson, and Lau, 1973). The usual quadratic normalization is to set the sum of the b's to zero, but the one adopted here is valid and more useful. In the sequel, a_1 and S are expressed in terms of demographic variables, while b_{11}, b_{12}, b_{13}, b_{22}, and b_{23} are constant over all households. The budget share of food is derived from Roy's identity (Varian, 1978, p. 93):

$$\frac{P_1F}{M_d} = \frac{a_1+b_{11}\ln(P_1/M_d)+b_{12}\ln(P_2/M_d)+db_{13}S}{-1+(b_{11}+b_{12})\ln(P_1/M_d)+(b_{12}+b_{22})\ln(P_2/M_d)+d(b_{13}+b_{23})S} \cdot \qquad (2)$$

The decision concerning participation goes in favor of getting food stamps if $\ln V_1 > \ln V_0$, which in this case leads to the inequality:

$$-e^{-S}[1 + b_{13}\ln(P_1/M_1) + b_{23}\ln(P_2/M_2)] > \ln(M_0/M_1) \cdot$$
$$[1 - (b_{11}+b_{12})\ln P_1 - (b_{12}+b_{22})\ln P_2 + (\tfrac{1}{2}b_{11}+\tfrac{1}{2}b_{22}+b_{12})(\ln M_0+\ln M_1)]. \qquad (3)$$

Condition (2) collapses to the case of the Cobb-Douglas with stigma if the b's are absent. (The parameterization of S does not affect that.) With known prices (2) can be estimated with nonlinear regression and (3), the condition for participating, is the basis for a probit analysis to estimate the b's using the various log terms as explanatory variables.

Ideally prices would be measured directly, but that is not possible for the geographic regions relevant to the sample. An alternative is available, which does not interfere with the rest of the modelling. One can use regional dummy variables or household budgets in place of prices.

Under the alternative, log prices are replaced by dummy variables standing for regions or household budgets interpreted as prices. Using the geographical dummy variables, log income, and the structure of S, estimates of $(b_{11}+b_{12})$, $(b_{11}+2b_{12}+b_{22})$, and $(b_{11}+b_{12})\ln P_1 + (b_{12}+b_{22})\ln P_2$ can be obtained, there being one of the last for each region.

The participation equation becomes the following: d=1 if and only if

$$S > -\ln[\ln(M_1/M_0)] + \text{a function of the b's.} \qquad (4)$$

Replacing S with $\underline{Z}'\underline{\delta}+\eta$, where $\underline{\delta}$ is a set of coefficients and η is a normally distributed disturbance with a mean of zero, and omitting the function of the b's, discussed below, the result is

$$\underline{Z}'\underline{\delta} + \ln[\ln(M_1/M_0)] + \eta > 0, \tag{5}$$

which is a probit model. Note that when the normalizing division by σ_η is attempted, the result is that a coefficient appears next to the second term--$1/\sigma_\eta$--which identifies σ_η.

4. The Data

The Food Stamp Cashout Project was conducted in six sites in South Carolina, Oregon, and New York (two in each state) in order to study the decision on the part of many elderly people to fail to join the Food Stamp program. The project ran from 1979 to 1982. "Cashout" referred to substituting cash for stamps in an attempt to reduce the visibility of the recipients.

The data set used here consists of 2,052 respondents eligible to receive food stamps. All lived in households containing only elderly people. The households are weighted to reflect differential sampling rates varying according to the type of interview (by telephone or in person) and the household size (the sampling gave some households with more than one elderly person one chance for each one). The weighted proportions of the sample in various categories are shown in Table 1. For more information about these data, see Butler, Ohls, and Posner (1985) and sources cited there.

Household budgets can be obtained for each of the regions in the sample and for each possible size of household (one to four persons). Household budgets are affected by geographical differences in the use

TABLE 1
Weighted Proportions of the Sample in Various Categories

Female	67.6%
Male	32.4
South Carolina	48.3
New York	23.4
Oregon	28.6
Black	33.1
Hispanic	1.8
Age 65-69	28.3
Age 70-74	31.8
Age 75 or over	39.9
Car owned or available	71.2
Education 0-7 years	50.6
Education 8-11 years	32.8
Education 12 years or more	16.6
One person in the household	81.7
More than one person in the household	18.3
Rural (self-defined by respondents)	24.4
Out daily	58.1
Out often (several times per week)	27.5
Out some (several times per month)	10.4
Out rarely (once per month or less)	4.0
Receiving SSI	17.7
Receiving Food Stamps	57.5

of food, shelter, and other goods, whether or not caused by prices. However, none of the results for the other variables in this work depends on the interpretation, and the results using the geographical dummies can be employed. The household budgets are interpreted as prices here.

5. The Estimated Equations

The equations are constrained further because of the way prices are estimated with household budgets, and because stigma is found to have weak effects on the budget share. Virtually all households (99.6 percent) have one or two members, since few uninstitutionalized elderly live in all-elderly groups of more than two. Further, it is reasonable to suppose that regions have systematically different budget shares of food, as do households of different sizes. The household budgets are calculated based on one set of ratios between region-specific price indices and thus are perfectly collinear with region dummies and the dummy variable representing households greater than one in size. As a result, the individual b's can be estimated only by omitting region dummies (or prices). Rather than omit household size, however, only the relative ratios between region-specific household budgets are used. Table 2 shows the household budgets considered and actually used. The values are shown in dollars, but all were divided by 100 to produce relative prices.

Stigma has little effect on the budget share. While in principle that causes no problem, in fact $b_{13}+b_{23}$ cannot be identified from the denominator. Therefore, we set $b_{13}+b_{23} = 0$. A test of including the term $\ln(1-(b_{13}+b_{23})\ln M_1)$ in the probit equation resulted in a chi-squared test value of 0.59 with one degree of freedom, and attempts to include

TABLE 2

Household Budgets in Dollars per Month,
Low-Income, All-Elderly Households

State	Region	Part of Budget	Household Size 1	2	3	4	Base
New York	Northeast	Food	100	182	263	345	356
		Other	158	288	417	547	564
Oregon	West	Food	99	181	252	344	354
		Other	170	310	450	590	609
South Carolina	South	Food	93	169	245	321	330
		Other	147	268	388	509	525

Source: Based on the Bureau of Labor Statistics News, USPL81-195, April 22, 1981. To the nonmetropolitan food and total consumption budgets found in columns two and three are applied the factors 1/12 (to convert annual to monthly amounts) and 0.28 and 0.51 to convert the base amounts to one and two person households consisting solely of the elderly. (See the Handbook of Labor Statistics, 1975--Reference Edition. Table 154, page 382 for the equivalence scales.) No equivalence is given for households of three and four elderly persons; here the budget is increased by 23% of the base amount for each of the third and fourth adults.

The first column only is used to obtain relative prices in this work. All six numbers are divided by 100.

($b_{13}+b_{23}$) in the equation of food expenditure resulted in near-perfect collinearity with the constant.

Similarly, the parameter attached to M_d, i.e., $b_{11}+b_{22}+2b_{12}$ in the denominator of the budget share proved to be very difficult to estimate and was set equal to zero. That amounts to adopting Christensen, Jorgenson, and Lau's restriction on their translog. The probable cause of the difficulty in estimating ($b_{11}+2b_{12}+b_{22}$) separately is that ln M_d has a rather small variance relative to its mean (mean = 5.8157, variance = 0.0985) and its coefficients in the numerator and denominator are not effectively estimable as a result.

Thus, in the equations that are used for the extensions and applications, the participation equation defines stigma and is estimated with stigma constrained to be negative; the equation for the budget share is defined recursively by substituting in the estimated values of d and S from the participation equation; and the common parameters in the numerator and denominator are constrained to be equal. The estimated equations are presented in Tables 3 and 4. The restriction of the equation to the Cobb-Douglas form is rejected (t=+13.62).

The equation for the budget share is found in Table 3. Although the estimated constant is large, 0.9098 or 0.9990, depending upon whether the interpretation of log-prices or dummy variables is used, it is largely offset by the effect of the mean of log-income, -0.8404 (the mean of income, 5.8157, times -0.1445). Cashout--substituting cash for food stamps--has a very unimportant direct effect, and the indirect effects are also minor. When regional dummies are specified, their effects are 4 and 1 percent for New York State and South Carolina, relative to Oregon. Blacks have smaller, and Hispanics have larger

TABLE 3

The Equation for the Budget Share of Food
in the Preferred Model

	Estimated Coefficients	Standard Errors[1]	t-values
Constant (log-prices)	0.9098	0.1278	7.12
Constant (regional dummies)	0.9990	0.0982	10.17
Cashout site	0.0006	0.0092	0.06
New York State[2]	0.0394	0.0132	2.99
South Carolina[2]	0.0108	0.0147	0.73
Black	-0.0329	0.0122	-2.70
Hispanic	0.0558	0.0321	1.74
Age 70 to 74	-0.0063	0.0122	-0.56
Age 75 or more	-0.0303	0.0115	-2.63
Positive effect (0-5)	-0.0009	0.0031	-0.28
Negative effect (0-5)	0.0004	0.0030	0.12
Car available	-0.0005	0.0115	-0.04
Education 8 to 11 years	0.0266	0.0119	2.23
Education 12 or more years	0.0196	0.0151	1.30
Household of 2 or more	0.0883	0.0248	3.56
Rural locations	-0.0175	0.0119	-1.47
Out daily	0.0154	0.0229	0.67
Out often	0.0064	0.0238	0.27
Out some	0.0054	0.0275	0.20
Male head of household	-0.0060	0.0280	-0.21
Household of one man	0.0583	0.0294	1.98
Getting SSI	-0.0177	0.0096	-1.84
Stigma times d[3] (b_{13})	-0.2674	0.1514	-1.77
Log-price of food (b_{11})	0.8257	0.2785	-2.96
Log-price of nonfood (b_{12})	0.2810	0.1625	1.73
Log-income ($-b_{11}-b_{12}$)	-0.1445	0.0106	-13.61

R = 0.1372, N = 2052, income elasticity of expenditures on food = 0.4555 (standard error = 0.0435).

[1]Adjusted by a factor of 1.3056, the square root of the design effect.

[2]The coefficients on New York State and South Carolina and the associated constant are derived algebraically from those on the log-price variables and the associated constant. Each set is valid only in the absence of the other.

[3]The values vary from -0.1755 to -0.5194 with a mean of -0.3144 and a standard deviation of 0.0434; the effect at the mean is 0.111. A change of one standard deviation in stigma (0.04343) results in a change in the budget share of 0.012.

budget shares than whites. Older people have smaller budget shares of food than younger people (all people in this study are 65 or older). More educated people have, in general, larger budget shares (note the coefficients of 0.0266 and 0.0196 in Table 3), although those with 12 or more years of education have slightly smaller budget shares than those with 8 to 11 years of education. The largest effect is that of a household's having more than one member, 8.8 percentage points. If a household consists of one male, it has a larger budget share of food by 5.8 percent. In effect, the last two numbers are effects relative to households consisting of one female. A rural location is associated with smaller budget shares. Mobility is associated with larger budget shares, and the effect increases as mobility does, to a maximum of 1.5 percentage points. Male heads of households indicate little difference, so the concept of head of household appears to be of little importance here. (That is true as well in the equation for participation.) Getting SSI is associated with smaller budget shares. Possibly, it is the case that getting SSI is an indicator of a lower level of stigma--for that reason, it is excluded from the participation equation--with which its effect, -0.0177, is consistent. That brings us to stigma, the prices, and income.

The effect of the variable measuring stigma is important. At the mean value of stigma, the effect is 8.4 percentage points (the mean, 0.3144, times the coefficient, -0.2674). A change of one standard deviation in stigma is associated with a change of 1.2 percentage points (the standard deviation of 0.0434 times the coefficient). The coefficients on the log-prices of food and nonfood are difficult to interpret as the parameters of the utility function. The hypothesis that they

sum to the negative of the value of the coefficient on log-income is rejected; the estimated sum is -0.962 (0.8257+0.2810-0.1445) and a t-value of -2.26 (based on the estimated variance-covariance matrix).

The coefficient of log-income, which appears in the denominator, is estimated to be -0.1445. In order to interpret the results more intuitively, the marginal propensity to consume food and the elasticity of demand for food are calculated. The m.p.c. is about 0.13, and the elasticity is about 0.49.

Table 4 lists the estimated coefficients of the equation for participation. Cash substituted for food stamps causes a small increase in the probability of participation. New York State is associated with a somewhat smaller probability, and South Carolina with a much smaller probability of participating than Oregon. Blacks have higher, and Hispanics have lower probabilities of participating, other things equal. The probability falls with age quite strongly.

The ownership or availability of a car is strongly associated with a decreased probability of joining. Rather than representing mobility to the relevant office, which would increase the probability of joining, a car apparently represents something else, perhaps self-sufficiency, or a car may be a proxy for social support, financial support, or wealth.

Education is a very powerful factor in deterring participation. It is both highly significant and highly important. Education of 12 or more years has a marginal impact of 21 percentage points, and education of 8 to 11 years, 14 percentage points, relative to less education. The association can be interpreted in various ways, but here it is interpreted as greater stigmatization of better-educated persons.

TABLE 4

The Equation for the Log of Stigma in the Preferred Model

	Estimated Coefficients	Standard Errors[1]	t-values[1]	Marginal Impacts on the Probability of Participating[2]
Constant	1.1045	0.2787	3.96	0.4304
Cashout site	0.0528	0.0775	0.68	0.0206
New York State	-0.0603	0.1086	-0.56	-0.0235
South Carolina	-0.2082	0.1130	-1.84	-0.0811
Black	0.2926	0.0960	3.05	0.1140
Hispanic	-0.1865	0.2834	-0.66	-0.0727
Age 70 to 74	-0.1977	0.0976	-2.03	-0.0770
Age 75 or more	-0.2849	0.0941	-3.03	-0.1110
Positive effect (0-5)	-0.0059	0.0282	-0.21	-0.0023
Negative effect (0-5)	0.0193	0.0247	0.78	0.0075
Car available	-0.3216	0.0883	-3.64	-0.1253
Education 8 to 11 years	-0.3529	0.0940	-3.75	-0.1375
Education 12 or more years	-0.5465	0.1189	-4.59	-0.2129
Household of 2 or more	-0.2160	0.2049	-1.05	-0.0842
Rural locations	-0.1080	0.1004	-1.08	-0.0421
Out daily	0.1491	0.1989	0.75	0.0581
Out often	0.1198	0.2018	0.59	0.0467
Out some	0.2566	0.2208	1.16	0.1000
Male head of household	0.0462	0.2211	0.21	0.0180
Household of one man	-0.1767	0.2437	-0.73	-0.0689
Trouble to get to food stamp office	-0.0575	0.0862	-0.67	-0.0224
Distance in miles to food stamp office	-0.0339	0.0541	-0.63	-0.0132
$\ln[\ln(M_1/M_0)]$[3]	0.1220	0.0445	2.74	0.0475

χ^2 statistic: 117.51 with 22 degrees of freedom.

Pseudo - R^2 = 0.0548

[1]Adjusted by a factor of 1.3056, the square root of the design effect.

[2]Defined at the mean of the data.

[3]The ratio M_1/M_0 is the percentage increase in income available using food stamps; this term is implied by the theory.

Households of two or more persons are somewhat less likely to join the Food Stamp program, as are households self-classified to be in rural locations, other things equal. Those effects can be interpreted in terms of the greater resources available to households of two persons and the conventional attitude assumed to exist in rural areas toward welfare.

Mobility is a major determinant of participation. Households in which someone gets out of the house daily, often, or some (more than once a month) are more likely to join the Food Stamp program. The effect does not consistently rise with the frequency, however, the largest effect being attached to getting out "some" (once a week to once a month).

Households headed by males are slightly more likely to participate, but those males living alone are less likely to join. Perhaps males, especially among the elderly, are more stigmatized concerning welfare, but feel a need to take care of a spouse financially.

Variables measuring the specific difficulty of getting to the office to apply for food stamps have the expected negative effects. The measures are the distance in miles to the appropriate office and the answer to a question as to whether the respondent would consider it a lot of trouble to get to that office. (Respondents who did not know were told where the appropriate office is.)

The scale of this probit model of participation is identified because of the presence of the variable nonzero limit in the equation. The coefficient estimated on the double-log term is the inverse of the standard deviation of stigma. There are three checks of the appropriateness of the estimate of $1/\sigma_\eta$. First, it certainly must be posi-

tive. That means an increase in the benefit increases the probability of participation. Second, the magnitude of its inverse squared, i.e., the maximum likelihood estimate of the variance of the random component of stigma, should be reasonable compared with the sample variance of $\underline{Z}'\underline{\delta}$, the systematic variation in stigma. Third, the scale of variation in stigma should be numerically similar to the scale of variation of the other terms in the utility function. These require judgments concerning the random or personal variation in stigma versus the systematic variation and the role of stigma versus other factors in the utility function.

These checks are the only basis for evaluating whether the measure of stigma is successful. It is not meaningful absolutely, only as it differs between persons and in its effect on observable outcomes.

A value of 0.1220 is estimated--positive, even significantly, with a t-value of 2.74. The second test is not so well met. The sample standard deviation of the systematic portion of stigma is 1.4302 around a mean of -0.2452, found using the sample itself, estimating stigma for each person, with the distribution skewed away from zero, while the estimated standard deviation of stigma is 8.1940, the inverse of 0.1220. For the third test, only two parameters can be compared; b_{13} from the equation for the budget share is -0.2674, and $b_{11}+b_{12}$ from the equation for the budget share is -0.1445. The average value of a_1, which multiplies ln P_1 in the utility function, is about 1.0022, most of it in the constant (0.9098 or 0.9990, depending on which interpretation, region dummies or log-prices, is used). The parameters apart from the constant appear to be of similar size. Although the results could be interpreted to show that stigma is highly variable, a vari-

ance of stigma of 2.0 is more reasonable based on the systematic portion alone.

In the next section, the equations are used in microsimulation to calculate the value of stigma in dollars.

6. Calculating the Dollar Value of Satisfaction Lost by Stigma

The dollar value of stigma is the difference between the actual stigmatized income received and the amount of unstigmatized income which would replace it. The compensation is given by C in the following equation:

$$\ln V_1 = \ln V_0$$

$$\ln(M_0+C) = \ln M_0 + \frac{[1+b_{13}\ln P_1+b_{23}\ln P_2-(b_{13}+b_{23})\ln M_1]}{[-1 + \frac{b_{23}b_{22}}{2}\ln P_1 + \frac{b_{12}+b_{23}}{2}\ln P_2]} \cdot e^{-S}$$

$$C = M_0 \quad -1+\exp \quad e^{-S} \frac{[1+b_{13}\ln P_1+b_{23}\ln P_2-(b_{13}+b_{23})\ln M_1]}{[-a + \frac{b_{23}+b_{12}}{2}\ln P + \frac{b_{13}+b_{22}}{2}\ln P_2]} \qquad (6)$$

If $M_0>M_1$, the household fails to participate; if $M_0<M_1$, the household participates. That is equivalent to the usual condition that V_1 exceed V_0, because V is increasing in M, or decreasing in all prices. The dollar value of stigma is less than or equal to the face value of all the food stamps offered. The cost can be added across all individuals in the population. If not all the exogenous variables belong to stigma proper, this exercise can be done without the other variables.

The 2,052 households considered here are eligible to receive $56,580 in monthly benefits. (Each benefit is weighted by the sampling weight for the household.) Those who are actually participating are eligible

to receive \$33,121, and those who are not actually participating are eligible to receive \$23,459. The weighted sum of the actual participants is 1,182, and of actual nonparticipants is 870. The average potential benefit is \$28.03 to participants, \$26.96 to nonparticipants, and \$27.58 overall. Stigma is $-\exp(\underline{Z}'\underline{\delta}+\eta)$, where η is not necessarily distributed standard normally. In terms of the probit model from which stigma is estimated, the coefficient of $\ln(\ln(M_1/M_0))$ should be divided into the other coefficients. If that coefficient is implausibly small to be interpreted as the inverted standard deviation of stigma, then the measure of stigma is too extreme, and the results of the microsimulation are in error. Those who qualify for medium-sized benefits are predicted to participate too little, because the estimate of the inverted standard deviation relates the effect of benefits to the effects of other factors, and the effect of benefits is inappropriately small. The problem is less severe for large and small benefits. The solution uses the standard deviation in one other way. The expected value of stigma is $-\exp(\underline{Z}'\underline{\delta}+0.5\sigma_\eta^2)$, using the mean of the lognormal distribution. Estimated stigma appears to become an overwhelming factor here if the actual estimate of σ_η is used (8.1940), or the value of b_{13} not incorporating $\exp(-32.8)$ is very small. The estimate of the inverted standard deviation of stigma is too small. The method used here is to employ the estimated equations; to divide the other coefficients by the estimated coefficient 0.122..., to determine the actual mean and variance of stigma calculated over the population; and to use an assumed value σ_η^2 to adjust the calculations to achieve more accurate microsimulations. The mean of stigma is -0.2452, and its variance is 2.0456. The simulation is done with no adjustment, which results in too many

participants, and with the addition of 2.0 to the term exponentiated in the negative-exponential stigma, which results in too few participants. Using that procedure, a projected total of $30,898 is accepted by 939 weighted participants (with the adjustment of 2.0). Of the total population 61.3 percent is placed correctly, although the rate of participation is understated (45.7 percent versus 57.6 percent). The distribution of predicted and actual participation is as follows:

		ACTUAL		
		Yes	No	Total
	Yes	32.3%	13.4%	45.7%
Predicted	No	25.2	29.0	54.3
	Total	57.6	42.4	100.0

Projected benefits accepted are understated by about 6.7 percent less than participation is, so the propensity of those eligible to receive large amounts to join is overstated, relative to the propensity of those eligible to receive smaller amounts. The average projected benefit is $32.92 for participants and $23.07 for nonparticipants. Of the $30,898 projected to be accepted, $6,036 is estimated to be consumed by stigma (19.5 percent). The total cost of stigma is thus $31,718 or 56 percent of the originally intended benefits. Changes in the specification result in little change in the projected cost of stigma to participants--about $6000 in either case. Thus, about 20 percent of the face value of accepted benefits and about 50 percent of the face value of all potential benefits is consumed by stigma.

The stigma equation can be examined in isolation, to evaluate which groups in the population are more or less stigmatized. That is, one can examine the effects of certain variables on the necessary compensation discussed above, which depends on the level of income

and on the strength of the interaction of stigma with prices (i.e., on b_{13} and b_{23}). That is not the same as examining the effects of geographical region, age, race, and sex of head of the household, and the composition of the household in the stigma equation directly, nor is it the same as examining participation rates in subpopulations, because the strength of stigma could be sufficient to impose costs without preventing participation. Table 5 indicates how the dollar cost of stigma is allocated across demographic groups and regions. Two estimates are provided. One bases the estimate of the cost of stigma on the stigma equation as estimated, without adjustment for the variance of the disturbance in stigma, resulting in too many projected participants; the other is based on the adjustment of adding 2.0 for that variance, resulting in too few participants. The relative results are similar.

In general, the results follow those for the size of the coefficients in the equation for stigma, except in the case of South Carolina. In that case, the lower income and higher available benefits to the persons involved lead to a lower cost of stigma in South Carolina than in Oregon despite the large coefficient assigned to South Carolina itself. Males incur higher costs than females, and whites, Hispanics, and blacks have costs in that order with whites having the highest. Costs rise with age; households of more than one person incur higher costs than households of one person. Households actually receiving SSI or food stamps have lower estimated costs.

TABLE 5

Estimates of the Cost of Stigma to Persons of Various Characteristics

Group	Cost per Person		Relative Cost
	Low Estimate	High Estimate	
Female	7.96	$14.08	1.000
Male	11.37	18.35	1.348
New York State	7.37	11.41	1.000
South Carolina	8.74	16.20	1.328
Oregon	11.06	17.60	1.526
Black	2.99	9.30	1.000
Hispanic	9.32	14.63	1.949
White	13.07	18.56	2.492
Aged 65-69	5.17	11.27	1.000
Aged 70-74	9.65	16.30	1.578
Aged 75 or more	11.36	17.77	1.772
Education 0-7 years	4.14	10.66	1.000
Education 8-11 years	12.72	18.98	2.142
Education 12 or more years	16.84	23.13	2.701
Household of one	7.68	13.40	1.000
Household of two or more	15.26	24.62	1.892
Receiving SSI	7.14	13.57	1.000
Not receiving SSI	11.04	17.40	1.373
Receiving FS (actual)	7.20	13.48	1.000
Not receiving FS (actual)	11.60	18.15	1.439
Receiving FS (projected)	4.22	5.42	1.000
Not receiving FS (projected)	20.37	27.37	4.962
Total	9.06	15.46	

7. Summary

In this paper, a translog utility function is estimated to examine the effects of stigma on participation in the Food Stamp program and allocation of the budget to food and nonfood. Stigma is found to vary greatly by socioeconomic group, and it imposes substantial costs on potential recipients, approximately 20% of accepted benefits and 50% of all offered benefits.

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