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A Comparative Theoretical Analysis of the Impact of The Food Stamp Program as Opposed to Cash Transfers on the Demand for Food

Kathryn S. Phillips and David W. Price

Comparative analysis of food demand expansion of a cash program, as compared to the food stamp program, is important for measuring trade-offs between goals of raising farm income and increasing food expenditures of the poor. A theoretical basis for assessing food demand impacts under each program is presented. Two effects are analyzed: 1) The effect on food demand of the individual household and 2) The effect of food demand at the aggregate level. Both indifference curve analysis and psychological need level theory are used.

The purpose of the food stamp program is to raise farm income and improve diets of low income people [Gold, Hoffman, and Waugh]. It has been argued that substitution of cash grants in lieu of food stamps could do more to increase farm income, provide assistance to more people, and would cost the government less than the present program. A national sample involving an "experimental" cash transfer among elderly food stamp participants is currently under way [U.S. Office of the Federal Register]. Comparative analysis of aggregate food demand expansion effects stimulated by food stamps or a cash program is important for measuring tradeoffs (or lack of tradeoffs) between raising farm income and increasing food expenditures of low-income households.

A framework for showing the effects of different kinds of food subsidy measures on

food consumption of an individual household was developed by Southworth in 1945. Other researchers have applied Southworth's theoretical framework to show food consumption effects of an individual household under the food stamp program prior to elimination of the purchase requirement in 1979 [Clarkson, MacDonald]. However, attempts to assess the impact of food subsidies on food expenditures indicate a lack of adequate theory explaining the transition from the household level to the aggregate level. Southworth recognized the problem by stating, "To turn this qualitative conclusion into a quantitative formula for the distribution of a subsidy among different income groups so as to maximize the total increase in aggregate food consumption would present a much more complex problem" (p. 57). Mittelhammer and West made a major contribution toward filling this gap by developing a theoretical analysis of the food stamp program (prior to elimination of the purchase requirement). Relying on the theory of the individual household, they formulated a quantitative rule to measure the impact of the food stamp program on food expenditures at the aggregate level.

The purpose of this paper is to present a comparison based on a theoretical analysis of

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the aggregate food demand impacts under the food stamp program prior to elimination of the purchase requirement, with that under current program provisions, and with that under a cash program. Data requirements necessary to estimate differences between aggregate food demand impacts under the current food stamp program and a proposed cash subsidy program will also be discussed.

The Effects on Food Expenditures of the Individual Household

Since the overall increase in food consumption under programs of different types will equal the total of program effects on participating households, this analysis of aggregate food expenditure changes will begin at the household level. Food stamps must be spent on food, but the increase in food expenditures of the participating household is not necessarily equivalent to the bonus value of stamps issued. The bonus value of stamps is the face value of the stamps minus the amount paid for the stamps by recipients. The food stamp program, by "freeing up" cash spent for food before participation, allows substitution of non-food for food items. A food stamp household receives a specified amount of food stamps and will choose among three options:¹

1. The household will use the stamps to increase food expenditures by the bonus value of the stamps.
2. The household will not change their amount of food expenditures, and substitute an amount of cash equivalent to the bonus value of the stamps on non-food items.
3. The household will increase food expenditures by less than the bonus value of stamps, and substitute some of the money formerly spent on food for non-food purchases.

If all participating households selected (1), the aggregate level of increased food expenditures would be equivalent to the total value of bonus stamps issued. If all households selected (2), there would be no increase in food demand. Summing across all households, it can be expected that demand expansion due to food stamps lies somewhere between the two extremes (option 3). This conclusion follows because both food and nonfood, as categorical groupings, are normal goods for most low-income households in the United States. The increase in aggregate food expenditures could be interpreted as the increase in the retail demand for food. The estimated farm food share in 1977 for U.S. farm food for at-home consumption was 38¢ [Boehm and Belongia].

Indifference curve analysis can be used to illustrate behavior of the food stamp household under the three listed options. It can also illustrate the effects of changing program regulations on food demand. Figure 1 shows the graphical analysis of indifference curve theory applied to the food stamp program as it existed before and after elimination of the purchase requirement, and as it would exist under a cash transfer program.

Before elimination of the purchase requirement, food stamp participants were required to pay $AC = CF$ dollars to receive a greater dollar amount of food stamps, CD . The value of the free (bonus) stamps, $F'D'$, depended on household size and income criteria. The participant's budget line was CDE , and the participant, assumed to use all stamps in the month they were received, consumed at least CD dollars worth of food. The participant whose pre-stamp utility was maximized at point F , and who had a zero income elasticity for nonfood at that point, maximized post-stamp utility at point D . If all participants consumed at least CF dollars worth of food prior to participation, and had a zero income elasticity for nonfood, the increase in aggregate food expenditures would have been equal to the value of bonus stamps issued (option 1).

The participant whose pre-stamp utility

¹Assumes both food and nonfood are not inferior goods; that is, the income elasticity for the good cannot be negative. The options correspond to current food stamp regulations.

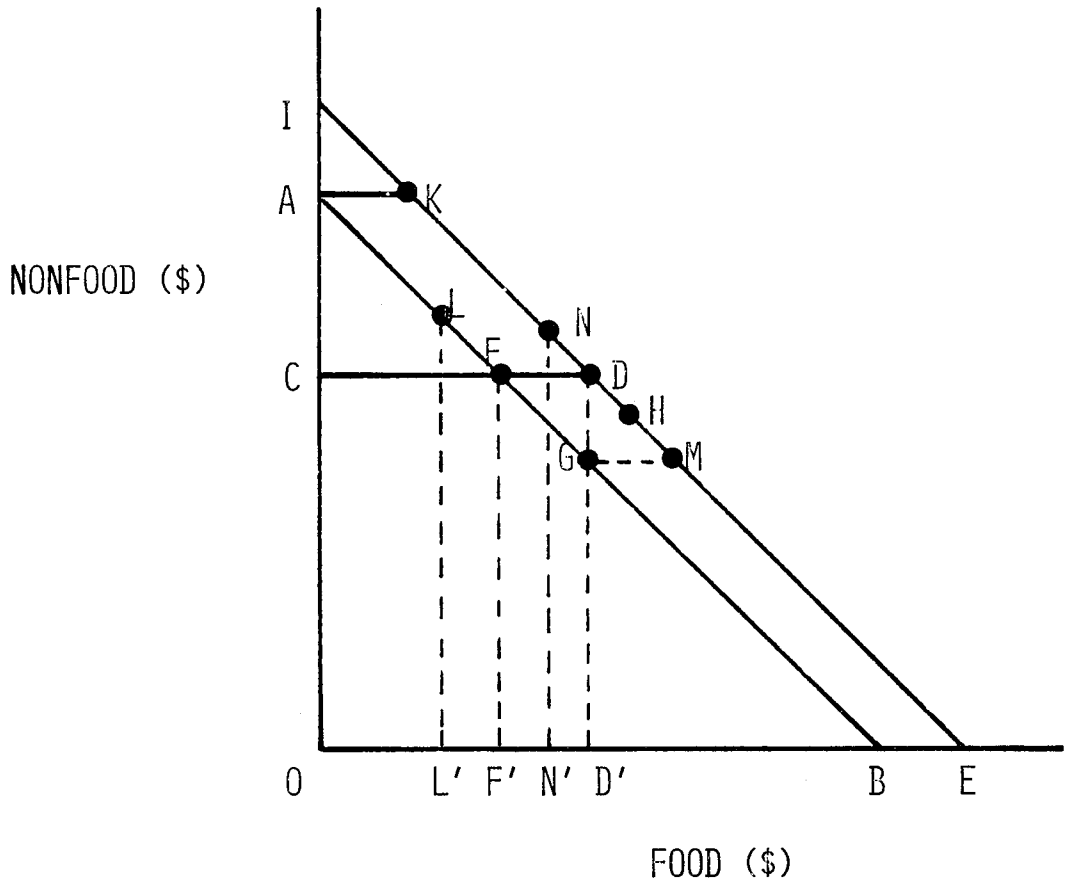


Figure 1. Indifference Curve Analysis of Food Stamp Household Behavior.

NOTES: Time period = one month. Analysis assumes all stamps are used up within the same month, and are not illegally traded or sold.

was maximized at point G, and who had a zero income elasticity for food at that point, moved to point D and did not change household food expenditures (option 2). The participant whose pre-stamp utility occurred to the right of point G, and who considered both food and nonfood to be normal or superior goods,² increased expenditures on both goods, say to point H (option 3).

For eligible households whose maximized pre-stamp utility occurred to the left of point G on budget line AB, there was the possibility that their post-subsidy utility maximizing point would have occurred to the left of point D on budget line IE. A level of utility, such as shown by point N, was unattainable for food stamp participants since food expenditures were assumed to be at least CD dollars. The economically rational eligible household would have chosen to participate in the program only if the level of utility associated with point D was higher than pre-stamp utility. The households who did decide to partici-

²This implies that the income-consumption path will be positively sloped since the income elasticity for food and nonfood will be greater than zero.

pate were "constrained" to operate at point D; that is, the household was forced to spend more on food than it would have spent if the bonus value of stamps had been given in the form of cash transfer. The amount of constraint can be defined as the minimum food expenditure required of the food stamp household, CD, minus what the household would have spent for food if the bonus value of stamps had been given in the form of cash. The constraint is defined for positive amounts — otherwise, the household is referred to as "unconstrained." The amount of constraint for the participating household whose post-stamp utility would have occurred at point N if the bonus value of stamps had been given as cash was equal to $N'D' = CD - ON'$. The household was "constrained" to be at point D because of the minimum required food expenditure.

Prior to elimination of the purchase requirement, a fourth option was possible. In Figure 1, the participating household whose pre-stamp utility occurred at point L increased its food expenditure by the amount $L'D'$, which was more than the bonus value of the stamps, $FD = F'D'$. Thus, under food stamp regulations in effect before elimination of the purchase requirement, a fourth option was:

4. A participating household will increase food expenditures by more than the bonus value of the stamps.

In 1979, the purchase requirement was eliminated. Households are now given bonus stamps free of charge. The budget line of the participating household is now AKE. Under current regulations, a "constrained" participating household will never increase its food expenditures by more than the bonus value of the stamps.

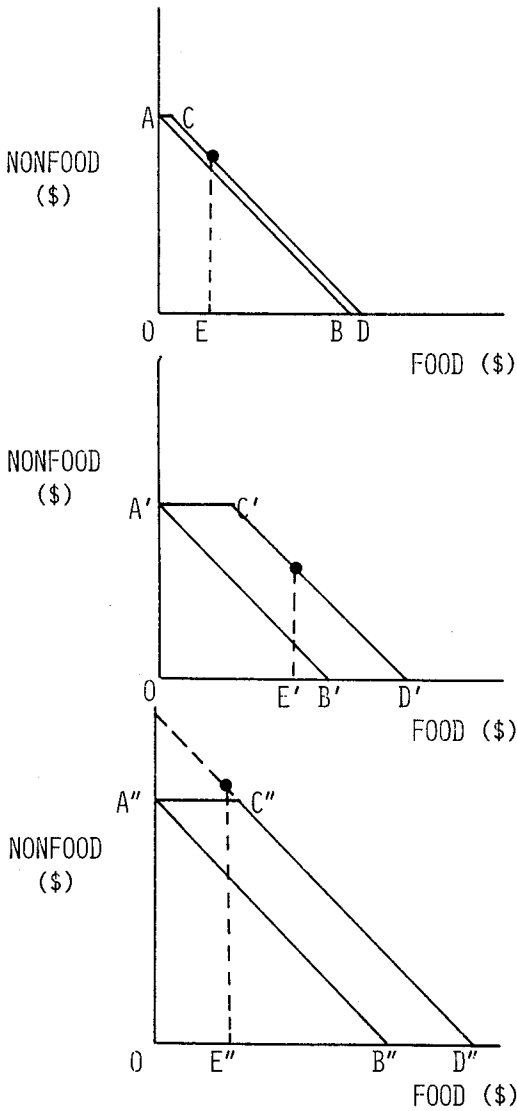
If a cash program were to be enacted, there would be no "constrained" households. Assuming the amount of cash subsidy would be equal to the bonus value of stamps, the budget line of the household would be IE. Any level of utility on budget line IE would be attainable.

The effect of a cash subsidy on food expenditures would be the same as the effect of food stamps on food expenditures for those participating households who are in an "unconstrained" position under the current food stamp program. For example, the household whose pre-stamp utility occurs at point G and who considers both food and nonfood to be normal goods may move to point H, regardless of whether the subsidy is in the form of food stamps or cash (Figure 1). Because aggregate food demand impacts under a proposed cash program are of interest, the immediate question that arises is: how many households are "unconstrained" under the present food stamp program?

Figure 2 shows the variation in food expenditure effects that occur among households of different sizes and incomes who are participating in the current food stamp program. Case I in Figure 2 shows a single person household. The net income reported by this household was a monthly Social Security check for \$283.15. With this reported net income, the household was receiving \$11.00 in food stamps each month, which shifts the budget line from AB to ACD. Because the household was spending more on food than the minimum required food expenditure ($AC < OE$), the household is "unconstrained." The household would spend \$72.00 on food each month regardless of whether the \$11.00 subsidy was given in food stamps or cash.

Case II in Figure 2 shows a self-employed household of 3 persons with a reported average monthly income of \$250.00. The household was receiving \$100.00 in food stamps each month, shifting the budget line from A'B' to A'C'D'. This household also was spending more on food than the minimum required food expenditure, which implies that the household is not "constrained."

Case III represents a household which may or may not be constrained. Post-stamp food expenditure is A"C", which is equal to the required minimum level of food expenditure. If the household spent one-third of its pre-stamp income on food, then the house-



CASE I: SINGLE PERSON HOUSEHOLD

283.15 NET MONTHLY INCOME

11.00 FOOD STAMPS/MONTH

61.00 SPENT ON FOOD IN ADDITION TO STAMPS

UNCONSTRAINED UTILITY MAXIMUM OCCURS AT POINT E

CASE II: HOUSEHOLD OF SIZE 3, PAID BY THE JOB

250 AVERAGE INCOME/MONTH

100 SPENT ON FOOD IN ADDITION TO FOOD STAMPS/MONTH

UNCONSTRAINED UTILITY MAXIMUM OCCURS AT POINT E'

CASE III: HOUSEHOLD OF SIZE 2

350 NET MONTHLY INCOME

128 FOOD STAMPS/MONTH

0 SPENT IN ADDITION TO FOOD STAMPS

POSSIBLY CONSTRAINED, SAY AT POINT E''

Figure 2: Food Expenditure Effects of Food Stamp Households of Different Sizes and Incomes.

NOTE: The data were obtained by household responses to a questionnaire study conducted by the authors in Washington State in February and March of 1981.

hold may or may not move from point E'' to point C'' if the subsidy was paid in cash. For example, if one-third of the household's pre-stamp income was devoted to food and the household has a zero income elasticity for food, the household will be "constrained." Under this assumption, the amount of constraint would be \$128 - \$116.67 = \$11.33. One can conclude that if this household spent one-third of pre-stamp income for food, the amount of constraint lies somewhere between \$0.00 and \$11.33.

The comparison of a household with a very low income (Case III, Figure 2) with another that is barely eligible (Case I) emphasizes the different effects on food expenditures among households of different sizes and incomes. Total impact, of course, depends on the distribution of households among various income levels and household sizes, and the distribution will affect the aggregate demand for food.

The Effects of Food Expenditures at the Aggregate Level

The aggregate effect of alternative food subsidy programs on food demand can be estimated by summing up the amount of increased food expenditures of all participating households. Indifference curve theory indicates that the aggregate increase in food expenditures prior to elimination of the purchase requirement could be measured by an amount consistent with households' income elasticity for food (for example, point F to point N in Figure 1) plus an additional amount (N'D in Figure 1) needed to meet the minimum required food expenditure.³ Summing across all households, the increase of aggregate food expenditures is expressed in equation 1.

³The 1974 food stamp regulations also permitted the household to purchase any quarterly fraction of its allotment. Although inclusion of this consideration gave the eligible household more choice of budget lines, indifference curve analysis can be used to show that all choices open to the participant in 1974 fit into one of the four options of participant behavior.

$$(1) \sum_{i=1}^n \left[\left(\frac{\% \Delta Q_f}{\% \Delta I} \right)_i (\% \Delta I)_i (Q_{f,i}) + F_i \right]$$

= Aggregate increase in food expenditures

where:

- n = number of participating households;
- $\left(\frac{\% \Delta Q_f}{\% \Delta I} \right)_i$ = income elasticity for food of ith household;
- $(\% \Delta I)_i$ = the ratio of bonus stamp value to pre-stamp income for ith household;
- $Q_{f,i}$ = pre-stamp food expenditure by ith household; and
- F_i = additional food expenditures motivated by the required minimum level of food consumption ($F_i = 0$ if household is unconstrained).

With elimination of the purchase requirement in 1979, equation (1) is still applicable for calculating the aggregate increase in food expenditures, although elimination of the purchase requirement implies that there is less probability that a participant will be "constrained" since the required minimum food expenditure is less than the food expenditure required with a purchase requirement ($AK \leq CD$ in Figure 1). However, equation (1) should not be used to immediately conclude that the aggregate increase in food demand after elimination of the purchase requirement would be less than before its elimination. Elimination of the purchase requirement should expand the set of participating households, say to m where $m > n$. Some eligible households who chose not to participate when there was a purchase requirement would be expected to participate in the present program because elimination of

the purchase requirement would then allow them a higher level of utility.⁴

Equation (1) is also appropriate for estimating food demand impacts under a cash program. Under a cash transfer all $F_i = 0$ in equation (1). One would expect the set of participants to increase to p where $p > m > n$, because no household would be restricted to a minimum food purchase requirement. Assuming $p > m > n$, a cash transfer program would be most consistent with reaching the most people in need. However, to determine whether increasing the "participation rate" and food demand expansion objectives are complementary goals or involve a tradeoff it would be necessary to compare estimates of equation (1) under the current food stamp program and a proposed cash program.

Testing the Validity of Indifference Theory to Explain Nonparticipation

While data from the USDA 1977-78 Nationwide Food Consumption Survey is available to estimate equation (1) under the current food stamp program, estimates of these parameters under a cash program can only be hypothesized. Analyzing the reasons for not participating in the food stamp program can aid in developing an empirical model that would accurately predict the effect on participation of cashing out the program. The previous section showed that the cash out has the potential of increasing aggregate food demand. This would occur if an increase in food demand that would result from an increase in the participation rate would offset the decrease in food demand that would be caused by "constrained" food

stamp households who would become "unconstrained" under a cash program.

During the 1974-75 period, it was the opinion of Food and Nutrition Service personnel that about 50 percent of all eligible households participated in the food stamp program. In other words, about one half of the households eligible for food stamps in the U.S. chose not to participate in the program because their preference for nonfood relative to food was such that the value of the stamps was considerably more than they wished to spend for food, or for other reasons which will be subsequently explored.

To examine the validity of indifference curve theory to explain nonparticipation and to help elicit other reasons for nonparticipation, characteristics of participants and nonparticipants from two recent surveys will be examined. The 1973-74 BLS Consumer Expenditure Survey showed the following differences between food stamp participants and eligible nonparticipants (Table 1). Total household income was higher among eligible nonrecipients while household size was smaller. This implies that if the eligible nonrecipients were to have participated, the average value of the bonus stamps would have been lower than for the recipients. Compared to recipients, a larger percentage of eligible nonrecipients were older and owned their homes. Recipients also had less education. There were a greater proportion of black households and female headed households among recipients. The percentage of current income from earnings was significantly higher among nonrecipients since a larger proportion were in the work force.

Food stamp recipients on the average spent more per month for food than the value of the stamps. The exact figure is difficult to calculate since not all food stamp households fully participated⁵ in the program. The average exchange value was \$91.60 per month,

⁴Elimination of the purchase requirement was simultaneously accompanied by important rule changes which tightened food stamp eligibility requirements. These changes tended to lower participation, and cloud the participation impact associated only with elimination of the purchase requirement. The simultaneous implementation of these changes means that there will never be data available which will enable a clean cut identification of the participation impact of eliminating the purchase requirement.

⁵The food stamp regulations at this time permitted a household to purchase any quarterly fraction of its allotment.

TABLE 1. Socioeconomic Characteristics of Households Eligible for Food Stamps: U.S. 1973-74 BLS Consumer Expenditure Survey.

Characteristic	Food Stamp Program Recipients	Eligible Non-recipients
Exchange value of stamps per household (monthly mean)	91.60	---
Purchase requirement per household (monthly mean)	40.38	---
Value of bonus stamps per household ^c (monthly mean)	51.22	---
Total food expenditure (at home) per household (monthly mean)*	118.73	88.44
Food away from home per household* (monthly mean)	10.01	19.06
Household size*	3.40	2.98
Total money income ^a (annual mean) ^{NS}	3,468.00	3,622.00
Total earnings (annual mean)*	1,377.00	2,398.00
Welfare, alimony, private pensions* (annual mean)	1,389.00	295.00
Other income sources (annual mean) ^{NT}	710.00	929.00
Head did not work past year (%)*	63.90	46.80
Percentage of income spent for food at home ^{b/NT}	34.50	29.30
Home Ownership (5)*	24.50	46.90
Age of head 65+ years (%)*	24.20	34.10
Female head (%)*	59.30	40.10
Race of head: Black (%)*	39.50	18.90
Education of head 12+ years (%)*	26.40	39.70

SOURCE: West

^aDoes not include bonus stamps.^bIncludes bonus stamps as income.^cComputed as the exchange value less the purchase requirement.

*Difference significant at the .05 level.

NS Nonsignificant at the .05 level.

NT Not tested for significance.

but a 3 person household was eligible to receive \$94.00 per month in stamps according to the July 1973 issuance schedule. For a 4 person household the exchange value was \$116.00. Thus, for a 3.4 person household the exchange value would be \$102.80. Using this figure the average amount spent in addition to stamps was \$15.93. Thus, the "average" recipient was to the right of point D (Figure 1).

Food expenditures for the eligible nonrecipients were slightly less than the value of stamps at the monthly mean for participating

households, indicating that the "average" nonrecipient was slightly to the left of point G in Figure 1. The study by West, Price and Price indicated the propensity to consume food from a dollar's worth of bonus stamps was \$.31 in 1973. The 1973 food stamp issuance schedule showed a household with 3 persons and a \$300.00 per month income received \$19.00 in bonus stamps. This should have resulted in an increase in food expenditure of \$5.89 ($\$5.89 = 19 \times .31$), for an estimated total after receiving stamps of \$94.33 ($\$5.89 + \88.44) which was almost

exactly equal to the minimum required food expenditure of \$94.00 for a 3 person participating household (as shown by the issuance schedule). According to this analysis, the "average" eligible nonrecipient should have been very near point D in Figure 1 if the household had participated in the program.

Another point of interest is point F in Figure 1. For any point to the right of F on the nonrecipients budget line, it was rational to participate in the food stamp program. Over this portion of the budget line it is impossible to have an indifference curve with a negative slope and increase utility from nonparticipation. For the above BLS sample, the amount of cash spent on food by the participating 3 person household at point D was $\$94.00 - \$19.00 = \$75.00$. The amount of money spent on food by a nonparticipant at point F would be \$75.00. This is \$13.44 below the mean of \$88.44 for nonparticipants. The standard deviation of at home food expenditures was \$78.65. Thus, point F is .17 of a standard deviation from the mean. If food expenditures were normally distributed 56.8 percent of the nonrecipient household were to the right of point F. Thus, at most, 43.2 percent of the eligible nonrecipients failed to participate before elimination of the purchase requirement because of the restriction on the minimum food purchases. One would expect the actual percentage to be much less than 43.2 with expected marginal rates of substitution between food and nonfood. With elimination of the purchase requirement in 1979, some eligible households who chose not to participate when there was a purchase requirement would be expected to participate in the present program because elimination of the purchase requirement would then allow them a higher utility.

These results suggest that other reasons for nonparticipation in the food stamp program are important. Several possible reasons have been suggested [MacDonald]. Lack of knowledge of the program and its eligibility standards are one possible cause. A much higher

proportion of recipients' income stems from welfare payments than is the case for nonrecipients (Table 1). Many welfare recipients are made aware of the provisions of the food stamp program when applying for welfare. Employed persons, even though receiving a low income, may consider themselves ineligible for food stamps.

Another factor is the cost incurred by the recipient in being certified as eligible for the program. The recipient must travel to a given location and spend some amount of time in becoming eligible and in obtaining stamps. Actual out-of-pocket costs in traveling are incurred and if time has some positive monetary value, this is also a monetary cost. If the potential recipient has a relatively high income, and consequently would receive few dollars worth of bonus stamps, these costs would make participation worth little or nothing. These factors have the effect of increasing the number of nonparticipating households.

Another factor possibly affecting participation is the social stigma attached to being interviewed about finances or being seen using food stamps. This has the effect of reducing the utility derived from obtaining bonus stamps. It has the effect of shifting the indifference curve downward and to the left. If this shift is large enough, total utility from food stamp participation will be less than without participation.

Recent findings by West, Price and Price indicate that certain aspects of human motivation theory relate to participation in the food stamp program. This theory, refined by Maslow, conceives human needs as falling into a hierarchy. Once needs at one level are satisfied to a certain degree, the individual moves to a higher level.

The lowest level is physiological need. This need is a concern for basic physical comfort. There is a concern for basic needs such as food, clothing and shelter. In the present day U.S. these basic needs are relatively well satisfied for most individuals and households. However, means of satisfying these needs are reflected in a desire for a

sufficient supply of tasty and nutritious food rather than a simple desire for something to eat.

The second level of need is security need. Relative to food consumption, persons with a higher security need would be hypothesized to refrain from trying new things. They would consume familiar foods. The third level of need is love and belonging. People with high levels of this need have a high concern for family and friends. The fourth level of need is self esteem. People at this level of need desire the respect and admiration of others. The fifth and highest level of need is self actualization. This includes the desire to be creative, and to try new things. People with high self actualization needs tend to have a concern for all people.

West, Price and Price found that food stamp recipients had a significantly higher level of physiological need than did nonrecipients. Furthermore, in a model including other relevant variables,⁶ food expenditures were positively related to physiological need. This shows that the shape of the indifference curve is flatter for food stamp recipients than for nonrecipients. Thus, nonrecipients would be less likely to participate in the food stamp program because of a lower physiological need.

Other characteristics of nonrecipients substantiate the differences in physiological need. More nonrecipients own their own homes (Table 1). Home ownership theoretically should reduce the level of physiological need since the need should be more satisfied. Nonrecipients have a higher level of income than recipients. This also indicates a lower level of physiological need.

The lower level of physiological need among nonrecipients implies that other

needs are relatively higher. Examination of the correlation coefficients using the Washington State data [West, Price and Price] shows self actualization and security needs to be somewhat higher among nonrecipients ($r = .061$ and $.034$ respectively). The higher self actualization need fits with theoretical expectations as a reason for nonparticipating in the food stamp program. More creative persons may prefer to find their own ways of coping with a low income situation rather than relying on government transfer programs.

Reasons for not participating in the food stamp program must be incorporated in an empirical model that could be used to hypothesize the effect on participation of cashing out the program. The cash out has the potential of increasing the participation rate because restrictions on minimum food expenditures are eliminated. On first examination, the minimum food expenditure required by food stamp recipients did not appear to be an important factor in explaining nonparticipation. However, when the recipient cost of obtaining the stamps is counted as an actual cost and because nonrecipients have a higher relative preference for non-food, use of indifference curve theory to explain nonparticipation is given some validity.

Other reasons for nonparticipation also may be important in explaining the change in participation if a cash program replaced the food stamp program. The psychological effort and the consequent reduction in utility from being interviewed about eligibility and obtaining the stamps presumably would not be affected by a cash out. However, from the viewpoint of the five need levels, a cash out has at least two effects. First, the stigma attached to the use of stamps in the grocery store is directly related to self esteem need. The cash out will tend to increase fulfillment of this need for recipients. Second, elimination of the restriction of the minimum food purchase may increase fulfillment of the self actualization need. These two effects result in an increase in utility to the recipient.

In summary, indifference curve theory

⁶Other variables included in the model were current income, liquid assets, a food stamp recipient dummy, value of free school lunches, pay period, household size, ethnic group, and a dummy for home produced meat. Food expenditures, income, liquid assets, and the value of lunches were placed on an adult equivalent basis.

does appear to provide a basis for explaining some nonparticipation among eligible households. In addition to the nonparticipation explained by indifference curve theory, other factors appear to be significant in explaining how the participation rate would be affected if a cash program were enacted. Estimating the aggregate food demand impact under a cash program would require an estimate of the predicted change in the set of participating households. Empirical models, such as qualitative response models, can incorporate both indifference curve theory and other reasons to accurately predict what the participation rate would be under a cash program. If an appropriate study was designed, data could be obtained to estimate the aggregate food demand impact that would result from a cash transfer program.⁷

Empirical Estimates of Food Demand Expansion Under the Food Stamp Program

Two methodologies that have been used to assess food demand impacts stimulated by the food stamp program are input/output analysis or a regression approach to estimate how a food stamp dummy variable affects food expenditures of eligible households. The input/output approach provides estimates of increases in business receipts of the food sector by assuming (a) how recipient household income is distributed among each sector after receiving food stamps, (b) constant prices, and (c) perfect elasticity of supply [Nelson and Perrin].

The regression approach is used to derive estimates of the average propensity to consume, which can be used to assess food stamp impacts on the aggregate increase in farm level food demand. The average propensity

to consume from bonus stamps has been estimated for selected areas in the U.S., but not from a sample representing the total U.S. population. West, Price and Price have estimated this propensity for Washington State households with 8-12 year old children (Table 2). Lane has estimated the average propensity to consume from a sample of low income households in Kern County, California. Both states have relatively high welfare payments so that the very low income households that likely exist in the Southeast are not represented.

Three estimates of the change in total farm level business receipts resulting from bonus food stamps were made for the year 1974 (Table 2). Two of the estimates are remarkably close considering the differences in estimation techniques and the problems of estimation.⁸

If a cash transfer replaced food stamps, the increase in demand for food is a function of individuals' income elasticities. The input/output solution under the cash program could be derived from the food stamp solution under the assumption that the aggregate amount of bonus stamps would not change. This assumption implicitly assumes that the participation rate does not change.

West, Price and Price used the regression approach that included value of food as the dependent variable and food stamp participation plus various socio-economic and psychological variables as explanatory variables. Results indicated that the value of food was more than twice as responsive to the receipt of bonus stamps as the value of food is to income at the mean income level. Lane's study shows similar results. By solving equation (1) for $\sum_{i=1}^n F_i$, it can be seen that the

⁷The authors are currently analyzing primary data from a representative state sample of low-income households in Washington State in an effort to estimate food demand impacts that would result from a cash transfer program replacing the Food Stamp Program in Washington State.

⁸The input/output approach captures the indirect and induced effects as well as the direct effects pictured by the regression approach. If the indirect and induced effects were eliminated, the aggregate effect on business receipts at the farm level would be closer to those cited for the regression results.

TABLE 2. Use of APC Out of \$1.00 of Bonus Stamps to Estimate Food Stamp Impacts on Food Demand, Fiscal Year 1974 (\$ Million).

	(1) APC Out of \$1.00 of Bonus Stamps (Evaluated at Mean Income Level)	(2) Fiscal 1974 Value of Bonus Food Stamps	(3) Average Farm Share (All Foods)	(4) Total Change in Business Receipts for Farm Level Food
West, Price, & Price (Washington State Sample)	.31	\$2,714.1 ^a	.38 ^b	\$319,720,980
Lane (California Sample)	.38	2,714.1	.38	391,916,040
Nelson & Perrin (National Model)	-----Input/Output Model-----			407,715,000

^aSOURCE: Boehm & Gallo, p. 23.

^bSOURCE: Boehm & Belongia, p. 13.

demand for food would decrease if a cash subsidy replaced the 1974 program under the very restrictive assumption that the set of participating households, *n*, would not change:

$$(1') \text{ Aggregate increase in food expenditures due to food stamps} = \sum_{i=1}^n B_i(APC_i)$$

$$= \sum_{i=1}^n \left[\left(\frac{\% \Delta Q_f}{\% \Delta I} \right)_i (\% \Delta I)_i Q_{f,i} + F_i \right]$$

where:

B_i = amount of bonus stamps received by i^{th} household; and

APC_i = average propensity to consume for i^{th} household out of \$1.00 of bonus stamps.

An example can be generated by using the 1973 Washington State data of West, Price, and Price. By using the mean levels of estimates in equation (1') and rearranging terms, the equation can be written as:

$$(2) \quad F = (B)(APC) - B(IE)$$

where F = Aggregate decrease in food expenditures among food stamp households in Wash-

ington State in 1973 if cash subsidies had been given instead of food stamps.

B = Amount of bonus food stamps issued in 1973 in Washington State, \$47,596,000 [U.S. Department of Agriculture].

APC = Mean level average propensity to consume out of \$1.00 of bonus stamps, .31 [West, Price, and Price].

IE = Mean level income elasticity of demand for food in Washington State in 1973, .07 [West, Price, and Price].

The calculated value of F in equation (2) indicates that a cash-out program in 1973 would have reduced food expenditures among food stamp households in Washington State by \$11,423,040. At an income elasticity of .07, this means that an additional \$163,186,285 worth of cash subsidies would have had to be given out in Washington State in 1973 to have had no effect on food demand ($163,186,285 \times .07 = 11,423,040$). This could have occurred if the participation rate in the food stamp program in 1973 was 22.58% and had increased to 100% under a cash-out program ($47,596,000 / (47,596,000 +$

163,186,285) = .2258). Without knowing how the participation rate would have changed, the effect of a cash-out enacted during 1973 (before elimination of the purchase requirement) cannot be clearly ascertained. Taking account of the sensitivity of the impact on food expenditures to variability of parameter estimates in equation (2), the only conclusion that can be made is that the change in total food expenditures resulting from a cash-out would have been somewhere between zero and a substantial decrease.

The comparison between the present food stamp program and a cash-out would be substantially different. The average propensity to consume food from bonus stamps should be less than before elimination of the purchase requirement. This can be expected because less households will be constrained with elimination of the purchase requirement. Consequently, the increase in participation needed to offset the decrease in food expenditures of the individual household would be less. Neither the regression approach nor the input/output approach address how the set of participating households would change if a cash transfer replaced the current food stamp program. Although either of these approaches could be used to estimate food demand impacts under the current food stamp program (no purchase requirement), the food demand impact under a cash program will remain unclear until studies are completed that incorporate models to explain how the set of participating households will change if a cash program were to be enacted.

Summary

This theoretical framework shows that food expenditures of food stamp households will decrease with a cash out. This effect would be substantial judging by results from past empirical studies. Participation rates are, however, expected to increase. Thus, to empirically measure the comparative effect of a proposed cash program on the demand for food will require further studies designed to estimate the effect on participation under a cash out program.

Indifference curve analysis shows that if the relative preference for nonfood is high enough, some households can be on a higher utility curve by not participating in the Food Stamp Program. However, this probably does not explain why a large number of households do not participate in the Food Stamp Program. Reasons such as the actual cost of obtaining stamps, the psychological cost and stigma attached to the use of food stamps should be combined with indifference curve theory to predict what the set of participating households would be under a cash program.

Past research on psychological need theory shows the relative preference of food was greater for food stamp recipients than for eligible nonrecipients. Needs other than basic physiological needs may be enhanced by not participating in the Food Stamp Program. A cash out has the potential for increasing the fulfillment of some of the needs above the physiological level.

Input/output analysis and regression models have been used to estimate food demand impacts prior to elimination of the purchase requirement. Such models are also appropriate for estimating food demand impacts since elimination of the purchase requirement. However, food demand impacts that would occur under a cash program requires an empirical model that can predict how the participation rate would change if a cash program replaced the current food stamp program. An example of an empirical model appropriate for this purpose is a qualitative response model. A representative sample of participating and eligible nonparticipating households could be designed to obtain information to empirically estimate the food demand impact that would likely occur if a cash program were enacted.

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