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An Analysis of the Market For Food Stamps

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I. Introduction

This paper represents an attempt to analyze the Food Stamp Program) not as a farm program nor as a welfare program but rather as a ket for a publicly supplied good. The analysis, therefore, concentrates the forces determining the demand for and supply of food stamps. It conducted in an attempt to contribute to an economic theory of public non-profit sectors of the economy, a subject neglected by economists il recently.

The analysis of the FSP is not important in itself for it is one of se programs the poor rightly claim has been studied too much and changed little. Paarlberg [10], Hoover and Maddox [4], Kotz [7], Segal [12], Steiner [13] among others have made studies of various aspects of the gram and of other feed programs. Instead, it is intended to be a case dy for the FSP is representative of a large number of public and non-fit activities. The FSP is characterized by a bureau which operates program and which faces not only a legislature from which it obtains annual appropriation, but it also sells the service it produces, ely food stamps, to eligible households. Colleges, some hospitals, ld adoption agencies, and YMCA's are among the diverse institutions activities which share these characteristics. The FSP was chosen

because it is a relatively simple example of this type of activity and because the author had some knowledge of the program. If the analysis explains the behavior of the FSP, then, perhaps, it can be applied to explain the behavior of similar programs and activities.

The model developed in this paper is an extension of a model of a "pure bureau" developed by Niskanen in 1968 [8]. A pure bureau in his terminology is one which trades its output for a budget. The extension is to what Niskanen called a "mixed bureau"--one that not only exchanges its output for a budget but also sells it at a unit price. The Food and Nutrition Service (FNS) of the USDA, the agency which administers the FSP along with other food programs, obviously is a mixed bureau. Niskanen has provided his own analysis of the mixed bureau as well as of other types of bureaus in a just-published book [9]. This analysis of the FSP can be viewed as a modification and application of his model.

In section II the model of the market for food stamps is developed. To test the model certain price and output implications of the model are developed and confronted with the history of the FSP in Section III. The test is unsatisfactory in the sense that data do not exist to estimate the complete model.

II. A Model of the Market for Food Stamps

There are four components to the structure underlying the market for food stamps. The first component is the Congress which authorized the program and outlined its details in the Food Stamp Act of 1964 and

in amendments in 1967, 1968, and 1971 (P.L. 88-525, P.L. 90-91, P.L. 90-552, and P.L. 91-671). It appropriates money annually to operate the program and constrains the program informally via appropriations hearings and the like.

The second component is the FNS, the agency within the USDA which administers the program.[1] It administers some six child feeding programs and two family food assistance programs of which the FSP is one. For our purposes the FNS can be viewed as operating three programs: the FSP, the Food Distribution Program (FDP)--the legal substitute for the FSP[2]--, and all other programs. The FNS is the sole-source supplier of the FSP and CDP to local welfare departments which make up the third component of the market.

Given that the states in which they are located have agreed to accept either the FDP or the FSP, local welfare departments choose to operate one or neither of the two programs--legally they cannot offer both. If the FSP is chosen, the local welfare department administers the program locally. This includes certifying households as eligible to participate, arranging for stamp receipt centers and the times during the month they are open for business, and administering the sale of stamps. The households eligible to participate in the FSP constitute the fourth component.

The analysis in this paper is set at the federal level and suppresses relations between local welfare departments and households and between the FNS and local welfare departments. Consequently, the FNS is viewed

as a sole-source supplier of the FSP and its competing program the CDP, constrained in its behavior by Congressional appropriations and intent, by the costs of running the programs, and by the demand for the program on the part of eligible households. The FNS, therefore, derives revenue from appropriations and from the sale of stamps and incurs costs in the operation of the programs. The revenue functions and the cost functions are discussed in turn.

The Revenue Function for Stamps

The total revenue from the sale of stamps is represented by:

$$(1) \qquad TR_s = \sum_i P_i p_{si} \bar{q}_{si} \qquad (i = 1, \ldots, N)$$

where:

$i = 1, \ldots, N$ household classes. The program operates with both household size and income classes, which have been collapsed here for notational simplicity.

P_i = number of participants in the ith household class of eligible households.

p_{si} = price per food stamp charged to eligible households in class i.

$\bar{q}_{si}$ = quantity of food stamps eligible household in class i must purchase if they are to participate.

The price and quantity of food stamps are derived as follows. To participate in the program an eligible household must expend a specified amount of cash called its "purchase requirement" on food coupons and in return it receives a specified number of coupons called its "coupon allotment".[3]

If a food stamp is defined as the quantity of coupons worth one dollar in terms of food, then $p_{si}\bar{q}_{si}$ = the purchase requirement, $\bar{q}_{si}$ = coupon allotment, and p_{si} = purchase requirement/coupon allotment. The purchase requirement is a positive function of household income within any household size class, and the coupon allotment is a positive function of household size.[4/]

The participation in the ith class, P_i, is the aggregate demand to participate in the program of households in the ith class.[5/] It depends upon the demand for food on the part of eligible households in the ith class, the price charged them for food stamps, and the quantity of food stamps they are required to buy if they are to participate. For instance, given a ceteris paribus increase in the price of food stamps, fewer households will find that participation in the program benefits them (if food is a normal good), and hence participation, P_i, will decline. Moreover, note that if p_{si} = \$1.00, then there is no benefit from participating and there is no demand. If the price is zero, food stamps would be a free good and all those eligible would participate, ceteris paribus. In consequence, $0 \leq p_{si} < 1$.

Appropriations Revenue Function

Congress imposes two sorts of constraints on the behavior of the FNS. The first is the legislation authorizing the program plus all of its amendments along with informal directives given to the bureau in the context of bargaining at appropriations time. The second constraint is the appropriations itself. We are here concerned with the appropriations constraint.

Congress is viewed as being faced with budget requests for a myriad of programs each year and must allocate its limited resources among them and as having preferences with respect to the program level of each program. With respect to the FSP it is willing to allocate added funds in order to expand the program from a low program level. At higher program levels it is willing to allocate fewer funds in return for the same amount of program expansion. Whether there exists a situation in which appropriations are lowered if the program is expanded is debatable.

Program level, of course, depends upon the aspect of the program that is judged to be important by Congress and that judgement changes from time to time as the political environment changes. Three aspects of the program have been important historically: the total number of stamps distributed ($Q_s = \sum_i P_i \overline{q}_{si}$), the aggregate number of participants ($\sum_i P_i$), and whether a participating household can afford to purchase a nutritionally adequate diet. It is assumed in this analysis that the maximum appropriations Congress is willing to grant the FNS to operate the FSP (TR_a) is a function of Q_s and of $\sum_i P_i$,[6] i.e.,

$$(2) \qquad TR_a = a(w_s Q_s, w_p \sum_i P_i) \qquad (i = 1, \ldots, N)$$

where: w_s and w_p are weights indicating the importance Congress attaches to the total quantity of stamps distributed and to aggregate participation respectively as aspects of program level. Of course, $w_s + w_p = 1$. Further, $\partial a/\partial w_s Q_s = a_s \geq 0$; $\partial a_s/\partial w_s Q_s \leq 0$; $\partial a/\partial w_p \sum P_i = a_p \geq 0$; $\partial a_p/\partial w_p \sum P_i \leq 0$.

The Total Cost Function

While the FNS administers several other programs in addition to the FSP, it is only the costs incurred by the agency attributable to the FSP

that are of interest.[7] As in any economic analysis it is the minimum cost for each program level that is of interest.

The FNS reports the costs of the FSP under the following heads: administration, stamp printing and destruction, certification, transportation, and the value of bonus coupons. See Table 1 for the breakdown of costs for recent years. Stamp printing and destruction costs clearly are a positive function of the number of stamps distributed. So also are certification costs for they are related via the number of households certified and thus via participation. Undoubtedly, some portion of administrative and transportation costs are also some positive function of the quantity of stamps distributed.

The value of bonus coupons equals the market value of the stamps in terms of food minus the revenue from the sale of stamps. It represents the total transfer payment made to participating households. The market value of the stamps is treated as a charge against the cost of the program while the revenue from the sale of stamps can be treated either as a deletion from costs or as an addition to revenue received by the agency even though the Treasury is the actual recipient of it. It is treated as an addition to agency revenue in this analysis implying that the marginal cost of stamps is equal to $1.00 plus the marginal administrative, stamp printing and destruction, certification and transportation cost. Define TC as the total minimum cost attributable to the FSP and,

(3) $$TC = c(Q_s),$$

where $\partial c/\partial Q_s = c_s > 1$ and $\partial c_s/\partial Q_s \geq 0$.

Agency Objective Functions

A main tenet of this paper is that the FNS administers the FSP so as to achieve its own objectives whatever other objectives it might seek to achieve. In this we agree with Niskanen who states that:

> "Among the several variables that may enter the bureaucrat's utility function are the following: salary, perquisites of the office, public reputation, power, patronage, ease of managing the bureau, and ease of making changes. All of these variables, I contend, are a positive monotonic function of the total budget of the bureau." [8; pp. 293-294]

If this is true, then it is analytically useful to regard bureaus in general and the FNS in particular as maximizing their total revenue subject to total cost in pursuit of their objectives. In essence, the FNS is regarded as a revenue maximizing monopolist in the peculiar but not uncommon position of selling its output simultaneously to Congress and also to participants in the program.

The FNS can, however, pursue its objectives in two ways. On the one hand it can pursue its own goals without regard for the intent of Congress except insofar as it is revealed through the appropriations revenue function. This view is identical to that portrayed and analyzed by Niskanen [8, 9]. On the other hand it can pursue its own objectives at the same time it co-operates with Congress in attempting to maximize the aspects of the program Congress deems important.[8/] Since some of the empirical implications of these two views differ substantially, both are pursued. For brevity the bureau which pursues only its own goals will be called a <u>budget maximizing bureau</u> to be consistent with Niskanen's terminology. The bureau which pursues its own goals in addition to those of Congress will be called a <u>modified budget maximizing bureau</u>.

The objective function of the budget maximizing bureau can be expressed as:

maximize TR subject to

(4) $TR \geq TC$,

where $TR = TR_a + TR_s$.

While changes in the importance Congress places on different facets of the program alter TR_a via changes in w_s and w_p, the basic form of the objective function does not chan e through time.

Such is not the case with the objective function of the modified budget maximizing bureau. As what Congress deems important changes so also will the objective function of the bureau. Specifically, from the program's incention in fiscal 1964 (it existed as a pilot program from 1961) through 1968 when hunger and malnutrition became politically important [7] the FSP was conceived and run as a device to support farm income. As such the total quantity of stamps distributed was of paramount importance because Q_s sets the lower bound on the food expenditures of participants and gross farm income is an increasing function of food expenditures. For the period 1964 to perhaps 1968 and probably until late 1969 the objective function of a modified budget maximizing bureau can be expressed as:

maximize

(5) $\sum_i P_i \bar{q}_{si} + \lambda^f [TC - TR]$, 9/, 10/

where $\lambda^f < 0$.

After hunger and malnutrition became politically important, however, the FSP was increasingly viewed as an in-kind welfare program in which aggregate participation was the facet of importance. By the end of 1969 this objective was probably paramount. For the period from 1969 to date the objective function can then be expressed as:

(6) $\sum_i P_i + \lambda^p [TC - TR]$,

where $\lambda^p < 0$.

Implicit in both equations (5) and (6) is the assumption that the FNS has been cost-constrained throughout its history; i.e., the FNS has never operated such that TR > TC. A reading of the presentations of the agency before appropriations hearings appears to bear this out: the FNS has never argued for the same or smaller appropriations for the FSP than it had the previous year. A strong implication of this assumption, however, is that the FSP has been run efficiently. Such an assumption is dubious.

III. Price, Output, and Participation Implications

The implications of budget maximizing and modified budget maximizing behavior along with the alterations in the program brought about by the politics of hunger in America can be used to deduce a variety of implications about the price, participation, and output behavior of the FNS in its conduct of the FSP. In this paper only those implications are drawn that can be used to distinguish between the two models of bureaus postulated and can be used to explain the major price, participation, and output fluctuations that have occurred over the history of the program. These hypotheses and the evidence relevant to them follow.

Price Implications

The price policies consistent with the objectives of the two types of bureaus are derived under two alternative assumptions about the importance placed by Congress on the total quantity of stamps distributed and aggregate participation. For the period 1964 to 1968 it is assumed that the total quantity of stamps was the program characteristic of primary importance to Congress and, therefore, $w_s = 1$ and $w_p = 0$ in the appropriations revenue function. For the period 1969 to date it is assumed that the program facet of paramount

importance has been aggregate participation and, thus, $w_s = 0$ and $w_p = 1$.

The budget maximizing bureau practices perfect price discrimination among household groups in order to ensure that total revenue is a maximum at each possible level of Q_s and ΣP_i. The pricing policy consistent with this objective differs according as Q_s or ΣP_i is viewed as paramount to Congress. For the period 1964 to 1968 when the FSP was regarded as a farm income support program the price policy would be:

$$(4a) \qquad p_{si} = \frac{\lambda_s - a_s}{(1 - 1/\beta_i)} \quad (i = 1, \ldots, N) \text{ for each level of } Q_s;^{11/}$$

where:

$\lambda_s \geq 0$ = added revenue given an increase of one in Q_s,

a_s = marginal revenue of appropriations with respect to Q_s,

β_i = absolute value of the price (p_{si}) elasticity of the demand to participate in the FSP on the part of households in class i. Given that the opportunity cost of expenditures on stamps is high for all poor people, it is assumed that $\beta_i > 1$.

For the period 1969 to date when the program has been viewed as a welfare program, the price policy would be:

$$(4b) \qquad p_{si} = \frac{\lambda_p - a_p}{\bar{q}_{si}(1 - 1/\beta_i)} \quad (i = 1, \ldots, N) \text{ for each level of } \Sigma P_i;^{11/}$$

where:

$\lambda_p \geq 0$ = added revenue given a one unit increase in ΣP_i,

a_p = marginal revenue of appropriations with respect to ΣP_i.

The price policies of the modified budget maximizing bureau flow directly from the first order conditions of equations (5) and (6). For

the period 1964 to 1969 the price policy would be

$$(5a) \qquad P_{si} = \frac{c_s - a_s}{(1 - 1/\beta_i)} + \frac{1}{\lambda^f (1 - 1/\beta_i)} \qquad (i = 1, \ldots, N)$$

where c_s is the global marginal cost of increasing Q_s by one stamp. For the period 1969 to date the price policy of such a bureau would be

$$(6a) \qquad P_{si} = \frac{c_s}{(1 - 1/\beta_i)} - \frac{a_p}{\bar{q}_{si}(1 - 1/\beta_i)} + \frac{1}{\lambda^p \bar{q}_{si}(1 - 1/\beta_i)} \qquad (i = 1, \ldots, N).$$

These pricing policies can be compared with each other and with the pricing policies of the FNS in the two periods. The comparisons are made to determine which model of a bureau most closely fits the behavior of the FNS. The comparisons are based on one assumption and one fact. The assumption is that the demand to participate in the FSP is more price elastic for households with low per capita household income than for those with high per capita household income. This appears reasonable given that the opportunity cost of expenditures on stamps probably declines as per capita income rises. The fact is that the quantity of stamps households have been required to purchase has throughout the life of the FSP been an increasing function of household size.

Now compare equations (4a) and (5a). Price discrimination is clear in both equations. Either type of bureau would charge high prices to households with high per capita income and low prices to households with low per capita income. The lefthand part of Table 2 shows average prices charged in 1964 to households of different per capita household income and household size classes. The prices for 1964 in Table 2 were derived from the Northern price and quantity "lists" by household income and size issued by the FNS to local welfare departments in Feb., 1964. The prices for 1964 are consistent with either model postulated as representative of FNS behavior.

A comparison of equations (4b) and (5b) yields the same condition. Within any household size category (and, therefore, holding $\bar{\bar{q}}_{si}$ constant) either type of bureau would charge lower prices to poor households than to the not-so-poor. The price and quantity lists issued by the FNS in Dec., 1969 and in July, 1971 and from which the 1969 and 1971 prices in Table 2 were computed reveal this type of price discrimination. Again, on this evidence alone there is no basis for deciding which model represents FNS behavior most closely.

Now note that price is independent of $\bar{\bar{q}}_{si}$ in equations (4a) and (5a) whereas price is dependent on $\bar{\bar{q}}_{si}$ in both equations (4b) and (6a). Moreover, in equation (4b) p_{si} is negatively related to $\bar{\bar{q}}_{si}$ whereas in equation (6a) p_{si} is positively related to $\bar{\bar{q}}_{si}$. Since $\bar{\bar{q}}_{si}$ is a positive function of household size, a comparison of the relationship between price and household size, holding income per capita (and, therefore, β_i) constant can distinguish between the models postulated.

In 1964 within any income per capita class, prices charged households of a given size averaged $.02 more than prices charged households of the next smaller size. The analagous average was $.06 for 1969 and was $.11 for 1971. In other words, as time passed a <u>positive</u> relationship between prices charged and household size, holding per capita income constant, has emerged. This result is consistent with the notion that the FNS has behaved like a <u>modified budget maximizing bureau</u>. The slight positive relationship that exists in the 1964 price structure can be explained either on the grounds of random error or on the basis that even in 1964 aggregate participation was not deemed of no political importance by Congress. These relationships clearly contradict the notion that the FNS has behaved as a <u>budget maximizing bureau</u>. In what follows the model of the <u>budget maximizing bureau</u> will be dropped in favor of the model of the <u>modified budget maximizing bureau</u>.

The history of changes in the price structure shows that the relationship between per capita household income and the price of stamps has only been strengthened by succeeding changes. In 1968 the prices charged the poorest of the poor were lowered after intense fire was directed at the FNS in hearings by the subcommittee on Employment, Manpower, and Poverty of the Senate Committee on Labor and Public Welfare in 1967 and 1968 [19]. The entire price structure was lowered by an average of 30 per cent in December, 1969 [15]. And, changes as a result of the 1971 amendments to the Food Stamp Act (P.L. 91-671) that are being made currently, drop prices for the poorest of the poor to zero and raise prices to the least of the poor. The former is in recognition of the fact that some of the poorest households have little or no cash income while the latter change is an effort to diminish the "notch" implicit in the old price structure [17].

Output and Participation Implications

There are several hypotheses that can be tested with respect to the output and participation implications of the models. One has to do with the relationship between participation in the FSP and the participation in the FDP, the other program administered by the FNS which directly competes with the FSP. Another set of hypotheses have to do with the time pattern of FSP participation and output and the changes in them brought about by the politics of hunger. Each is dealt with in turn.

It has been noted that for the purposes of analysis the FNS can be regarded as a three program bureau: the FSP, the FDP, and all other programs it operates. The FSP is financed by annual appropriations authorized under the Food Stamp Act of 1964 as amended. There is no such specific legislative authorization for the FDP. Instead, it is operated with funds authorized under Section 32 of P.L. 74-320 which allocates 30 per cent of customs receipts annually to the USDA to be used in a variety of unspecified ways to support farm income. These funds are not subject to the annual appropriations process and are not dependent upon the level at which the FDP is operated. The FNS receives the funds regardless whether the FDP exists.[12] Next, it is important to realize that the FSP and the FDP perform the same function (one sells food stamps to the poor while

the other gives food away) and legally are substitutes for each other; that is both subsidize the food expenditures of low-income families and legally the two cannot be operated in the same local welfare district simultaneously.

These circumstances provide a revenue maximizing bureau with the opportunity of substituting the program the appropriations for which are dependent on program level for the program the funding for which is independent of output. This allows the opportunity to use the funds so released to be used elsewhere. If this is the case, then through time one would observe participation in the CDP to fall as participation in the FSP rose, ceteris paribus.

A test of this hypothesis is provided by regressing participation in the FSP by month from July, 1963 to June, 1971 (X_1) [14] on participation in the FSP (X_2) [14] and the seasonally unadjusted civilian unemployment rate expressed as a percent (X_3) [16]. The latter is included to hold constant the hypothesized positive relationship between participation and the unemployment rate. The seasonally unadjusted rate is used to capture seasonal variation in participation resulting from seasonal fluctuations in unemployment. The results are as follows:

$$(13) \qquad \hat{X}_1 = 1{,}699{,}792.80 - \underset{(-12.67)}{.20094832X_2} + \underset{(12.50)}{682{,}366{,}49X_3} \qquad \bar{R}^2 = .6886$$

number of observations = 96

The numbers in parentheses are t-ratios. The effects of both variables are significantly different from zero and consistent with expectations.

The second set of hypotheses arise from the politics of hunger and malnutrition in America. This issue was politically explosive, beginning in April, 1967, as the result of hearings in Mississippi of the Senate Subcommittee on Employment, Manpower, and Poverty. [19] Thereafter, evidence piled up rapidly of malnutrition among the poor, deficiencies in federal food aid programs, especially the FSP and the FDP, and of discriminatory administration of the programs at the local level. (See, for instance [5, 6, 7, 12, 13].) Among the issues relevant here were: that the benefits under the FSP did not ensure that recipients could afford a nutritionally adequate diet; that many of the poor could not afford to participate in the program; and, that there were many local welfare districts in the country that offered neither the CDP nor the FSP.

Competition for funds as involvement in S. E. Asia grew and foot-dragging by the Agriculture Committees in Congress kept appropriations from growing as quickly as they might have otherwise. Appropriations for the FSP grew by $45 million in fiscal 1968 and by $40 million in fiscal 1969. As pressure grew, however, FSP appropriations jumped by $525 million for fiscal 1970 and by $500 for fiscal 1971.[13]

Such increases in revenue from appropriations can affect prices and output in two ways. If the program doesn't have nationwide coverage, efforts are made to open projects in counties not offering either program; that is, expand the number of eligible households. And there is also a tendency to lower prices.[14] Furthermore, as the public and

Congress increasingly adopted the view that the FSP should ensure that recipients could afford a nutritionally adequate diet, there was upward pressure placed on the quantity of stamps households were required to purchase in order to participate. In the absence of increased revenue from appropriations and given the pressure to increase participation, such a move alone would have forced food stamp prices down. This is so because a ceteris paribus increase in the quantity of stamps required would have lowered participation (see [2; p. 17]) and prices would have to have been lowered to offset the decline.

In sum then, it is hypothesized that the effects of the politics of hunger were to shift the revenue from appropriations curve upward and to increase the quantity of stamps recipients had to buy. The implications of these actions are to increase participation via program expansion and to lower food stamp prices both of which would increase participation. All occurred. While the program was slowly expanded into new areas in fiscal 1968 and 1969 (189 new projects in fiscal 1968 and 462 in 1969 [14]), prices and quantities did not change until mid-fiscal 1970, the first year in which appropriations greatly increased.

To estimate the effects on participation and output, two regressions were run. First, participation in the FSP by month from July, 1963 to June, 1971 (X_2) was regressed on the seasonally unadjusted civilian unemployment rate (X_3), the number of FSP projects in operation (X_4),[15] and a dummy variable taking on the va-ue zero for each month from July, 1963 through January, 1970 and taking on the value one thereafter (X_5). Second, the total quantity of stamps distributed per month from July, 1963 to June,

1971 (X_6) was regressed on the same independent variables. The districts offering the program are measured by the number of FSP projects in operation and so also is the geographic expansion of the program. The dummy variable captures the effect of the simultaneous change in price and quantities. Prices were lowered from a weighted average of \$.62/stamp to \$.43/stamp whereas the weighted average required quantity per person per month was raised from \$17 to \$24 in an announcement on December 18, 1969 [15]. Implementation of the change was not wide-spread until February, 1970.[16]

The results are as follows:

$$(14) \quad \hat{X}_2 = -1{,}949{,}242 + \underset{(4.26)}{463{,}399.70X_3} + \underset{(14.71)}{2{,}632{,}528X_4} + \underset{(7.26)}{2{,}742{,}656.9X_5}$$

$\bar{R}^2 = .9399$ No. of observations = 96

$$(15) \quad \hat{X}_6 = -56{,}455{,}627 + \underset{(4.55)}{12{,}484{,}081X_3} + \underset{(11.60)}{52{,}327{,}271X_4} + \underset{(9.22)}{87{,}776{,}702X_5}$$

$\bar{R}^2 = .9368$ No. of observations = 96

The figures in parentheses are t-ratios. Each of the coefficients in the two equations is significantly different from zero and each is consistent with expectations. Expanding the program geographically by one project adds 2,632 participants and increases output by 52,327 stamps. An increase in the unemployment rate by one-tenth of a percentage point increases participation by 46,339 and output by 1.2 million stamps. And, the combined price and quantity changes increased participation by 2.7 million and output by 87.8 million stamps. Increasing unemployment, geographic

expansion of the program, and the abrupt liberalization of the program aid way through fiscal 1970, therefore, adequately account for the 50 per cent jump in participation in fiscal 1970 and the 116 per cent increase in fiscal 1971 [14].

Finally, from an examination of the residuals it appears that there was no more than a three month lag between the time implementation of the liberalization was wide-spread and the time the response to it was completed. This is a very rapid response by any standard especially since eleven states did not implement the change until March and April. It is especially impressive in the light of the fact that lack of knowledge about the program was given as the primary reason for the institution in 1968 of an outreach program in which the poor were employed by the USDA, trained as nutrition-aids, and sent out into the community to inform needy households about the program [19]. These results cast doubt on the belief that lack of knowledge about the program was an important reason for lack of program participation. Rather, they support the view that until the program was liberalized, it was not worth the while of many of the poor to participate. This view is buttressed by Steiner's observation that participation in food programs dropped by over 50 per cent as the FDP was replaced by the FSP by the end of fiscal 1967 [13; p. 215].

IV. Summary and Conclusions

Two models of bureaus were built in which one postulated that the FNS was a revenue maximizing, price discriminating monopolist while the other postulated that the FNS maximized revenue while it actively pursued the intent of Congress as well. The former model was rejected in favor of the latter. The test used to reject the former model was rough and not tightly controlled and thus the author regards the rejection as tentative to be supported or

refuted by other evidence. If it happens, however, that other tests support a characterization of the FNS as a bureau actively cooperating with the relevant Congressional committees, it will be consistent with the impression one receives from the various historical treatments of the FSP [7, 12, and 13 Chap. 6]. It appears that the subcommittee on Agriculture of the House Appropriations Committee has had an uncommon influence over the conduct of the FSP. This is in contrast with the impression this author has of relations between Congress and other federal bureaus. Clearly, the model of a <u>budget maximizing bureau</u> which does not pursue the intent of the relevant Congressional committees except insofar as it appears in the appropriations revenue function appears to fit some other federal agencies more closely. Obviously, much more research on these matters is needed.

Of what importance is this effort? The fact that the model has not been rejected out of hand makes the author more hopeful that it might have some predictive as well as explanatory power. Had the model been rejected as an explanation of the price and output behavior in the food stamp market, doubt would have been cast on the efficacy of similar models of other public sector markets. And, if the model had no empirical content, then it would not be suitable as a wheel on which to spin normative theories. The fact that it was not rejected gives a little more credence, above that lent by intuition alone, to the kind of work Niskanen has been about in the normative sections of his recent book [9]. Much more work needs to be done, however, on the demand side of such models before they can serve as convincing guides for policy-making.

FOOTNOTES

* A revision and extension of [1]. I have had helpful discussions of this subject with colleagues at the U. of Minnesota, at the U. of Wisconsin where I spent a pleasant and fruitful leave during 1970-71, and with members of the now defunct NCR-77. I am particularly indebted to Martin Abel, Lee Martin, and William Niskanen for setting my ideas straight and in simplifying my analysis. Of course, none are responsible for any errors.

1/ Although the Consumer and Marketing Service administered the program until 1969, the bureau will be referred to as FNS for simplicity.

2/ The FDP is the program under which food is distributed free to low-income families in counties participating in the program. Prior to 1971 it was called the Commodity Distribution Program.

3/ As a result of the 1971 amendments (P.L. 91-671) eligible households may now purchase less than the maximum coupon allotment. This regulation does not affect the empirical base of this study.

4/ Until 1970 [15] both the purchase requirement and the coupon allotment were functions of household size and income.

5/ The demand to participate in the program is derived in [2].

6/ This is a variant of a function suggested to me by William Niskanen in comments on an earlier draft. It differs from the "budget-output functions" in [9; pp. 24-30] only in that it recognizes that the FSP has a number of politically important facets. Ensuring that participants could afford nutritionally adequate diets simply involves guaranteeing that $\bar{q}_{si}$ is set at a level determined to be adequate by nutritionists. Since the implications of raising $\bar{q}_{si}$ to such a level (as occurred in late 1969) is relatively simple to trace through, this facet of the program was excluded from the formal analysis.

7/ The formal model regards the FNS as if it operated only one program and thus ignores the interrelations between the costs of the FDP and the costs of the FSP. Their costs are interrelated because they are competing programs in the sense that only one can be operated in any area. Thus, a local welfare district that switches from the FDP to the FSP alters the costs of both programs. This complication is not essential to the analysis.

8/ I am indebted to William Niskanen for pointing this distinction out to me.

9/ I am indebted to Martin Abel for suggestions leading to this particular way of formulating the problem of maximizing gross farm income with the program.

10/ For the use of a similar analytical technique in examining the employment behavior of a nonprofit agency subject to constraints on the amount of labor it can use, see [3].

11/ Equations (4a) and (4b) are obtained by maximizing

(4c) $a(w_s Q_s, w_p \sum P_i) + \lambda_s [w_s (K_s - Q_s)] + \lambda_p [w_p (K_p - \sum P_i)]$

with respect to P_i (or p_{si} since the same result obtains) where K_p and K_s are constants. To derive (4a) from (4c) set $w_s = 1$ and $w_p = 0$. To derive (4b) from (4c) set $w_s = 0$ and $w_p = 1$.

12/ In fact the Consumer and Marketing Service receives Section 32 funds in order to purchase the commodities and the FNS receives Section 32 funds in order to process and distribute them. Congress from time to time does put restrictions on the use to which Section 32 funds can be put. For instance, P.L. 90-91 prohibits Section 32 funds from being used in the FSP.

13/ These figures come from various agriculture appropriations bills: P.L. 89-556 for 1967; HR-10509 for 1968; HR-16913 for 1969; P.L. 91-127 for 1970; and, HR-17923 for 1971.

14/ The effect of an exogenous change in revenue from appropriations can be shown by differentiating (6a) with respect to a_p, the marginal revenue from appropriations. This yields:

(6b) $\partial p_{si}/\partial a_s = -1/(\bar{q}_{si}(1 - 1/\epsilon_i)) \gtrless 0$ as $\epsilon_i \lessgtr 1$ for all $i = 1,\ldots,N$.

15/ A project is a county, city, or an Indian reservation which operates a FSP program independently of other local units [14].

16/ Thirty-two states implemented the program changes in January and February, 1970. Ten more states implemented the changes in March and another state was added to the list in April. February was chosen as the date at which implementation was wide-spread.

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Table 1: Summary of federal costs and participation in Food Stamp Program, fiscal 1968-71

	1968	1969	1970***	1971***
	dollars			
Value of bonus coupons	173,116,687*	228,788,020	550,874,720	1,523,055,857
Certification	4,358,783	6,981,000	9,392,089	20,200,000
Destruction	66,000	88,000	105,000	226,000
Printing	1,411,571	4,671,668	4,262,824	13,369,811
Transportation	34,072	58,720	72,600	255,189
Administrative	8,296,702**	10,394,485	13,336,048	17,830,938
Total	187,283,815	250,981,893	578,043,281	1,576,937,795
	persons			
Average mthly participation	2,211,224	2,878,113	4,340,030	9,382,089

* Includes $2,487,679 funded by OBO

** Includes $47,203 funded by OBO

*** Obligations, not costs.

Source: FNS-USDA [14]

Table 2: Average prices per stamp charged participants in Food Stamp Program by per capita household income and size of household; 1964, 1969, and 1971

Income per capita per mth.	1964				1969				1971			
	number of persons per household											
	1	2	3	4	1	2	3	4	1	2	13	4
0-19	.29	.28	.31	.31	.02	.03	.06	.07	0	.03	.05	.07
20-29	.50	.49	.53	.55	.04	.20	.19	.22	.03	.15	.19	.22
30-39	.56	.57	.63	.64	.14	.30	.29	.34	.13	.23	.27	.33
40-49	.60	.64	.71	.70	.21	.40	.39	.45	.19	.33	.38	.44
50-59	.64	.67	.76	.75	.29	.49	.51	.57	.25	.41	.49	.55
60-69	.73	.75	.79	.77	.36	.55	.58	.66	.31	.50	.56	.66
70-79	.73	.72	.80	.77	.43	.64	.73	.72	.38	.59	.70	.77
80-89	.73	.77	.80	.78	.50	.64	.78	.75	.44	.65	.77	.85
90-99					.57	.64	.79	.77	.50	.75	.88	.92
100-109					.64	.64	.79	.77	.56	.85	.90	

Source: Computed from Basis of Issuance Tables for Feb., 1964 (Northern Issue), Dec., 1969, and July, 1971; FNS-USDA. [14]

Tables are truncated in that the source tables give prices for households up to 8 persons and for higher income per capita income classes in later years.