U.S. Food Stamp Programs: Effects on Farm Prices and Income

by

Steve W. Martinez

and

Praveen M. Dixit[1]

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Abstract

This paper points out that each dollar spent on the Food Stamp Program expands recipient's food expenditures by 27 cents and raises net farm income by 14 cents. The price and income effects could be larger if other food assistance programs are included.

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U.S. Food Stamp Programs--Effects on Farm Income and Prices

The U.S. Food Stamp Program (FSP), which was first initiated in 1939, has historically had two broad objectives: i) to raise the nutrition levels of low-income households, and ii) to provide a source of disposal for government-supported surplus agricultural products. This latter objective was also expected to generate added demand for agricultural products and raise farm income and prices.

Past studies on the FSP have mostly focused either on the nutritional aspect of the programs (Devaney, Haines, and Moffitt, 1989; West and Price, 1976) or on the impact that the programs have had at expanding recipient's food expenditures (Nelson and Perrin, 1978; Clarkson, 1976). The price and income effects of these subsidy programs on farmers have, however, rarely been addressed. Yet, from the limited empirical evidence available, these effects could be substantial. Tweeten (1979), for instance, using a very simple partial elasticity approach concluded that food stamp programs raised farm income by $1.1 billion and farm prices by 4 percent in 1975. Other studies (Lane, 1980) show similar effects.

Our primary objective in this paper is to estimate, in a rather comprehensive manner, the price and income effects of the food stamp programs. This will allow us to evaluate whether food stamp programs mostly benefit only low-income urban households or whether the benefits are passed on to the rural farm sector. In the process, we also evaluate the effects that the FSP has had in expanding recipient's food expenditures. We use data (Nation-wide Food Consumption Survey, 1979-80) more recent than those employed in previous studies. By using data for 1979-80, we are able to assess the impacts on food expenditures of eliminating the purchase requirements (EPR) in 1979.

We approach the problem in two stages: first, we econometrically estimate the additional expenditure on food items that these programs have generated; then, we use these additionality estimates and the Static World Policy Simulation (SWOPSIM) modeling framework (Roningen, 1986) to obtain the price and income effects of the food stamp subsidies. These food subsidies are represented by price wedges in the modeling framework.

Estimating Additionality of Food Stamps

Not all the subsidy that is offered to low-income households is in fact spent on food. Consumers typically use some of the income freed by bonus food stamps to purchase non-agricultural items. To estimate the additional expenditure on food generated by the bonus food stamp programs, we specified an equation similar to that estimated by Devaney and Fraker (1989). The general form of the equation is:

$$E_h = X_h\beta + \epsilon_h$$

where E_h is per capita weekly household expenditures by the h^{th} FSP household, X_h is a vector of household characteristics which includes variables such as the value of food stamps received, participation in subsidized school breakfast and lunch programs, ethnic composition, geographic dispersion, and household age distribution. β is a vector of unobserved parameters to be estimated, and ϵ_h is a $N(0, \sigma^2)$ random error term.

The data used in the estimation are from the low-income supplement to the 1979-80 "Nationwide Food Consumption Survey" (NFSC-LI). This survey provides data on the use of food by approximately 2500 low-income households residing in the forty-eight contiguous states and includes detailed information on household food use, which is defined as the food and beverages used by a household from its home food supplies during the seven days

preceding an interview. In addition, information is provided on household characteristics related to food use, such as participation in the food stamp program, participation in other food assistance programs, household composition, income, education and income of the household heads, location, tenancy, and food-buying practices.

We used Ordinary Least Squares (OLS) regression to estimate the specified relationship (table 1). The R^2 is .25 and most parameter estimates are statistically significant at the 5% level. The marginal propensity to consume food (MPC) out of food stamps, represented by the coefficient on household per capita face value of food stamps, is significant at the 1% level.

Our results indicate the MPC out of food stamps is .272. In other words, each dollar of food stamp expenditure increases household food expenditures by 27 cents. This is often referred to as "additionality" in the U.S. food stamp literature.

How does our estimate compare with those of other studies? Devaney and Fraker (1989), using the 1977-78 NFSC-LI unweighted data, obtained an additionality estimate of .212. Senaur and Young (1986), Smallwood and Blaylock (1985), and Chen (1983) also obtained estimates for 1977-78 that are broadly comparable to our 1979-80 estimates.[1]

This is not to say that there are not studies that show estimates that are different than ours. Brown, Johnson, and Rizek (1978) obtained an MPC

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[1]It would appear that the MPC estimated with 1979-80 data should be smaller than those using 1978-79 data because of the elimination of the purchase requirement. Remember, however, that the FSP was changed in 1979 such that the eligibility requirements became a lot more rigid. This may suggest that stricter enforcement of the eligibility criterion may have outweighed the gains in additional purchases that could have been had from the elimination of purchase requirements.

Table 1. Food Expenditure Equation for Food Stamp Program Participants, 1979-80.

Explanatory Variables	Coefficient Estimate[a]	Explanatory Variables	Coefficient Estimate[a]
Intercept	17.915* (1.445)[b]	North Central	-2.728* (.733)
Household per capita weekly before-tax income	.090* (.000)	South	-2.833* (.623)
Household per capita income squared	-.000** (.000)	West	-1.637 (.926)
Household per capita number of guest meals	1.895* (.221)	Nonmetropolitan	-.694 (.441)
Female head present	-3.353* (.782)	Suburban	-1.401** (.551)
Spanish origin	2.156* (.763)	Household head is 35 to 59 years old	1.478* (.442)
Reduced price school lunch	-.726 (.508)	Household head is 60 years old or over	.153 (.529)
Household per capita weekly value of subsidized school breakfasts	-.176 (.218)	Household per capita weekly value of home-grown food	.162 (.201)
Black	.501 (.421)	Household per capita weekly value of food received as gift or as payment	-.017** (.009)
Number of household members	-.673* (.118)	Household per capita face value of food stamps	.272* (.013)

Source: Nation-wide Food Consumption Survey, 1979-80.

[a]A single asterisk indicates parameter estimate is statistically significant at the 1% level. A double asterisk indicates statistical significance at the 5% level.

[b]Standard errors are presented in parentheses.

estimate of .45 using the 1978-79 NFSC-LI data, while Devaney and Fraker's (1989) estimated an MPC of .49 with the same data. Both these studies, however, used weighted data to scale measures of incomes, food stamp benefits, and food expenditures to household size.

What can we conclude from the additionality estimates?: that not all the food stamp subsidy is in fact spent on food. Only about a third of each dollar spent on the FSP goes to additional food expenditures; the rest is used to purchase non-agricultural items. We also found that our 1979-80 estimates were not very different than estimates that were obtained using 1977-78 unweighted data, suggesting that elimination of the FSP purchase requirements may only have had modest effects on household food expenditure habits. Finally, comparisons with other empirical studies indicate that use of different estimation methodology could substantially raise the MPC estimates.

The Modeling Framework

To evaluate the income and price effects of the U.S. food stamp program, we used the SWOPSIM modeling framework (Roningen,1986). A SWOPSIM model is characterized by three basic features: i) it is a price equilibrium model, ii) it is an intermediate-run static model that represents world agriculture in a given year; and iii) it is a multicommodity, multiregion partial equilibrium model.

The economic structure of SWOPSIM models includes constant elasticity domestic supply and demand equations. Trade is the difference between domestic supply and total demand (absorption). The policy structure is embedded in equations linking domestic and world prices. Policies are inserted as subsidy equivalents at the producer, consumer, export, or import levels.

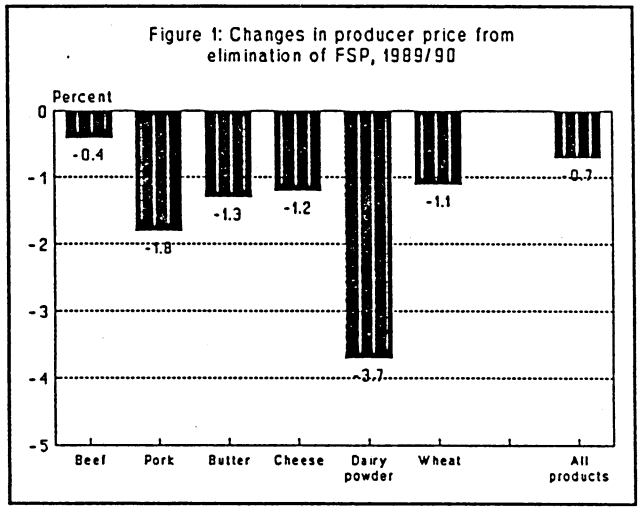
The FSP program is represented in the modeling framework as a price subsidy to consumers. We derive the per unit price subsidy in three stages: first, we calculate the total value of consumer subsidy to all food groups by multiplying the estimated MPC (0.272) by the total FSP expenditures in the given year ($12.9 billion in 1989); then, we allocate these subsidies to the individual food groups using the typical food expenditure patterns of low income households (OECD, 1987); finally, the per unit subsidy for each food group is obtained by dividing total subsidy for that group by domestic consumption. Details on per unit subsidies for the different food groups are presented in the appendix table A1. Note that subsidies to grain products were not calculated because data on the share of expenditure on grains was not available.

The version of SWOPSIM that we use for this study (DEMO89) is based on the 1989/90 marketing year data. The world is divided into 3 regions—the U.S., the EC, and an aggregated Rest-of-World. Twenty-two agricultural commodities representing about 90 percent of the total value of U.S. agricultural production are included in the model: beef and mutton; pork and poultry; dairy, including manufacturing milk, butter, cheese, and other dairy products; wheat; corn and other coarse grains; rice; soybeans and soybean products, and other oilseeds and oilseeds products; sugar; cotton; and tobacco.

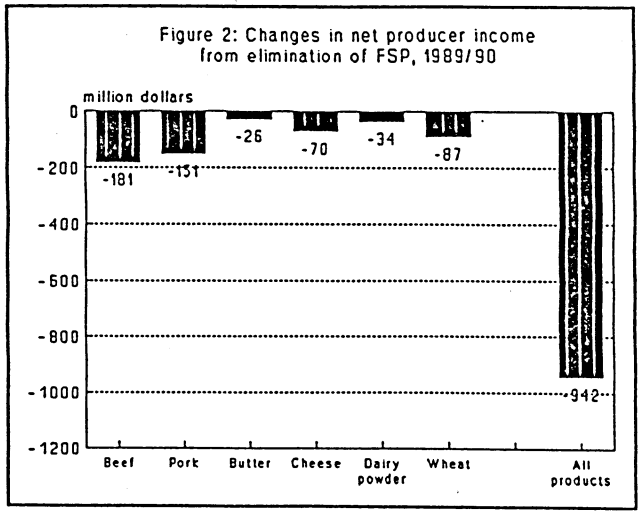
New equilibrium solutions are obtained by eliminating the price wedge representing food stamp subsidies. The new solution represents an approximation of the resulting adjustments in production, consumption, and trade in the given year, with the important proviso that all other conditions remain the same as in the base year, 1989/90.

Price and Income effects of FSP

Our results indicate that eliminating the FSP under 1989–90 conditions would lower U.S. producer prices an average of 1 percent (figure 1). In other words, the FSP has had a small but positive influence on the price of most agricultural products. The rise in prices as a result of the FSP has been greatest for dairy products, ranging from 1.2 percent for cheese to 3.7 percent for dairy powder. This is because per unit subsidies on dairy products are, on average, larger than those for other products. Pork (1.8 percent) and beef (1 percent) prices have also experienced modest gains because of the FSP. Producer prices for cereals, however, have remained largely unchanged, except for wheat prices (1.1 percent).



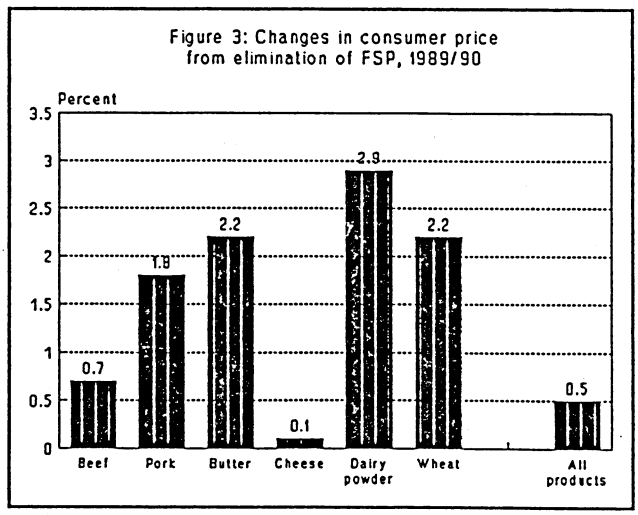
Agricultural producer income in the United States is $0.9 billion higher because of the FSP (figure 2). Beef and pork producers account for 45 percent of the increase while dairy producers account for about 15 percent. Increases in incomes of cereal producers are very small.



How important is the FSP program to farm income? Our results indicate that every dollar of

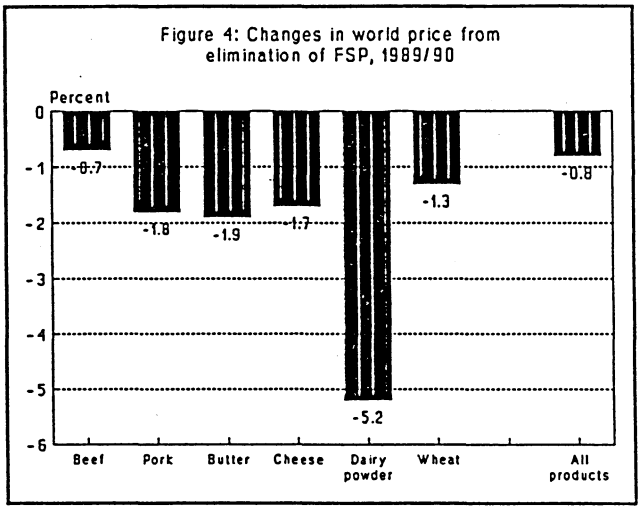
expenditure on the FSP under 1989-90 marketing conditions raises U.S. producer income by 14 cents. There are, however, substantial differences among commodities. A dollar of expenditure on beef and pork consumption raises producer incomes by 9 cents, whereas a dollar spent on dairy products increases producer incomes by 17 cents. This suggests is that if raising producer incomes is the primary objective of the FSP, then gains to producers would be greater if the FSP could be tied to commodities such as dairy products.

Consumers, not surprisingly, are the biggest beneficiaries from the FSP. Elimination of the program would increase consumer incentive prices about 2 percent for dairy products, wheat, and pork (figure 3)[2], and lower consumer food incomes by $1.1 billion under 1989-90 market conditions. Remember though that the FSP implied a subsidy on food consumption of $1.88 billion. This means that the food income loss to consumers has been mitigated by $819 million because of the decline in market (world) prices resulting from decreases in food purchases. The total income loss to consumers is much higher—the total value of the FSP ($12.9 billion) adjusted for the change in food income from lower market (world) prices.



[2]Consumer incentive price is the market (world) price less the per unit subsidy implied by the FSP. Elimination of the subsidy would raise the price faced by consumers.

Because SWOPSIM is a global modeling framework, we also have some estimates on the international trade impacts of the FSP (figure 4). These effects, however, are very modest. World prices for dairy products would fall by 2 percent while that for pork would drop by 1.8 percent if the FSP were eliminated. The impact on other product prices are almost negligible.



What can we learn from the price and income effects of the FSP? Our analysis indicates that, on average, these effects are rather small. A dollar of expenditure on the FSP raises producer incomes by about 15 cents and farm prices by just 1 percent under 1989-90 market conditions. There are, however, differences among the various food groups, and the dairy sector, in general, appears to be impacted much more by the FSP than other sectors.

Limitations of Analysis

The economic implications of the FSP are likely to vary depending on the period under analysis. Our study uses additionality estimates based on 1979-80 NFSC-LI data, food expenditure patterns derived from OECD (1987) data for the seventies, and model information pertaining to 1989-90 supply, demand, and trade marketing year data. Changes in any of these, especially the food expenditure patterns of low income households, could alter the results substantially. Food expenditure patterns are important because they influence

the allocation of total consumer subsidies to the various commodity groups and could greatly affect the farm income implications of the FSP.

Equally important as a determinant of the price and income impacts of the FSP are estimates of additionality which could be influenced greatly by the methodology used in estimating the MPC. As we indicated earlier, weighting data to scale measures of incomes, food stamp benefits, and food expenditures to household size appears to have an important impact on the MPC estimate. Devaney and Fraker (1989) show that the MPC could double from 0.212 for unweighted data to 0.424 for weighted data. For 1989 when $12.9 billion was spent on the FSP, this would imply an increase in consumer food subsidies from $2.74 billion to $5.47 billion.

The price and income effects of the FSP are also likely to be underestimated because consumer subsidies on the cereal sector was not included in the model. Data on food expenditure patterns pertaining to cereals were not available. Consequently, the only effects of the FSP on the cereal sector came through simulated changes in the livestock sector. If the amount of subsidies to the cereal sector could be directly incorporated into the model, then the changes in incomes of cereal producers should be larger, though the income multiplier itself could be smaller.

Finally, our analysis of the price and income effects of food subsidy programs only relates to the FSP. It does not take into account other food programs, such as the School Lunch Program, the School Breakfast Program, the Women, Infants, and Children Program, and the Temporary Emergency Food Assistance Program (TEFAP). Additionality on these programs are generally considered high (OECD, 1987), and the price and farm income effects could therefore be substantial.

Conclusions

Our objective in this paper was to estimate the price and income effects of the U.S. Food Stamp Programs. We conclude from our analysis that these effects are rather modest. A dollar of expenditure on the FSP raises net farm income by only 14 cents. There are, though, differences in the income effects among the commodity groups, being larger for dairy products and smaller for meats.

While these estimates may appear small, we believe that these represent the lower bounds of the possible income and price effects of all food subsidy programs. Estimation methodology that raises the additionality estimates of the FSP, or inclusion of other subsidies such as the School Lunch Program, the School Breakfast Program, and the Temporary Emergency Food Assistance Program TEFAP which have high additionalities could be expected to raise the price and income effects. After all, these other programs accounted for nearly 40 percent of the total costs of U.S. food assistance programs in 1989.

We are aware that the FSP, more so now than ever before, is being viewed as a means to raise the nutrition levels of low-income household and to provide an outlet for disposal of government-supported surplus agricultural products. Whether it has in fact achieved either of these objectives has been the subject of much debate over the last two decades. Be that as it may, our chief concern is still about producers. And, to the extent that the FSP has raised farm incomes, albeit marginally, we feel the programs should be welcomed by farm interests, especially in this era of high budget deficits and gradual decline in assistance to agricultural producers.

Appendix table A1: Food Stamp Program Additionalities and Per Unit Price Subsidies for Various Products, 1989

Product	Food Expenditures of Low-Income Families (% of Total)	Additional Food Expenditures[a] (mil. $)	Per Unit Subsidy[b] ($/ton)	Percent Subsidy[c] (% of expdt.)
Beef & Veal	15.5	539.9	48.38	1.1
Pork	15.0	522.4	70.00	2.7
Poultry	8.0	278.6	29.15	1.5
Fluid Milk	8.3	289.1	4.42	0.7
Butter & Margarine	1.6	55.7	110.08	3.3
Cheese	3.2	111.5	42.09	1.0
Dairy Powder	1.2	41.8	166.53	10.0
Sugar	1.3	45.3	6.14	0.9

[a]Obtained by multiplying column 1 by additional amount spent on food due to the FSP in 1989; .27*$12.9 bil., where .27 is the MPC from the food stamp bonus and $12.9 bil. is the total cost of the FSP in 1989.

[b]Divide column 2 by quantity demanded in 1989.

[c]Divide column 2 by total consumption expenditure for each food group.

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