THE IMPACT OF THE DIRECT PEANUT PRICE SUPPORT PROGRAM ON FARM INCOME AND GOVERNMENT COST

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Two major programs — allotment-quota and price support — have been in force to support peanut farming since 1952. The purpose is to restrict production of peanuts while supporting the price of peanuts produced. Production is restricted through the allotment-quota program, determined by the Secretary of Agriculture, and converted to a national acreage allotment. However, minimum national acreage allotment has been fixed at 1.61 million acres. The price support program provided that price be supported no lower than 75 percent of the parity price of peanuts. Under the programs, peanuts produced by the grower are sold on the market at the support price for edible uses and excess quantities are sold to the government at the support price. Peanuts purchased by the government are stored and later sold for crushing at the going market price. Because peanuts for crushing command a much lower price than the government acquisition price, the purchase-and-resale operation results in a net loss representing public cost of the peanut price support program.

This study attempts to measure the impact of a direct price support program which was carried out in addition to the allotment-quota program. Specifically, the program's marginal impact was measured by estimating differences in farm income and government cost which occurred as a result of the program by comparing actual results to estimated gross farm income and government cost that would have prevailed in a free market.[1]

Models for Estimating the Free Market Price of Peanuts

The key for measuring the impact of the price support program on farm income and government cost hinges on the estimation of peanut price assuming actual production levels. The free market price model was constructed as follows: Quantity-price relationships for edible and crushing uses were derived separately given the demand characteristics for each market. These estimates were then combined into one relationship from which the free market price was obtained.

Demand for edible uses include peanuts consumed in the form of salting and roasting, and in the manufacture of peanut butter, candy and sandwiches. The model for the quantity-price relationship for edible uses was expressed as:

$$Y_{et} = B_0 + B_1 Z_{1t} + B_2 Z_{2t} + B_3 Z_{3t} + U_t \qquad [1]$$

where:

Y_{et} is quantity of peanuts purchased for edible uses in year t, measured in pounds per capita;

Z_{1t} represents per capita disposable income in dollars;

Z_{2t} refers to the average price received by the farm in cents per pound; and

Z_{3t} denotes the price of tree nuts in cents per pound.

The B's refer to parameters associated with respective independent variables. U_t refers to a random element. The parameters in Equation [1] were estimated by using multiple regression on annual data over the period 1952 to 1972. The following empirical result was obtained:

$$Y_{et} = 6.46542 + 0.0013298 Z_{1t} - 0.158484 Z_{2t}$$
$$\phantom{Y_{et} = }[8.26] \qquad [9.82] \qquad [-2.06]$$
$$- 0.032713 Z_{3t} \qquad\qquad\qquad [2]$$
$$[-1.89]$$

where the variables are as defined above. The figures in parentheses are t-statistics, associated

with each parameter. The relationship produced an R^2 — value of 0.92.

Peanuts in excess of edible uses are purchased by the Commodity Credit Corporation (CCC) at the support price level set by the government. They are stored and sold later on the market for crushing. In selling peanuts CCC has limited flexibility in price bargaining. The quantity in storage, plus expected new purchases, weaken the position of the government in getting an equitable price for old peanuts. The quantity-price relation for crushing may be expressed as:

$$Y_{ct} = A_0 + A_1 X_{1t} + A_2 X_{2t} + A_3 X_{3t} + A_4 X_{st} + V_t \qquad [3]$$

where:

Y_{ct} refers to the price of peanuts for crushing;

X_{1t} denotes the quantity of peanuts used for crushing in pounds per capita;

X_{2t} and X_{3t} represent the price of cottonseed and the price of soybeans, respectively, in cents per pounds; and

X_{st} refers to the quantity of peanuts held in stock by the CCC, measured in pounds per capita.

The A's are parameters associated with respective independent variables and V_t represents a random disturbance.

The parameters in equation [3] were estimated by using multiple regression for available annual data over the years 1952-72. The following empirical result was obtained:

$$Y_{ct} = 1.7036 - 0.414151 X_{1t} + 0.42445 X_{2t}$$
$$[1.90] \qquad [-2.56] \qquad [1.92]$$

$$+ 0.96439 X_{3t} - 0.25332 X_{st} \qquad [4]$$
$$[1.43] \qquad [-0.67]$$
$$R^2 = 0.74$$

As indicated above, peanuts produced in any year t, denoted by X_{pt}, will be sold partially for edible uses, Y_{et}, and partially to CCC. Those sold to CCC will be partially resold for crushing, X_{1t}, and the balance held in storage, X_{st}, when the new marketing season begins. Hence, at the beginning of the new season the relationship can be expressed as:

$$X_{pt} = X_{st} + Y_{et} + X_{1t} \qquad [5]$$

Equation [5] provides a linkage between the relationship [1] and relationship [3]. The amount of peanuts held in stock by CCC, X_{st}, can be expressed in Equation [5] as $X_{st} = X_{pt} - Y_{et} - X_{1t}$.

When X_{st} in Equation [3] is replaced by $[X_{pt} - Y_{et} - X_{1t}]$ and Y_{et} is replaced with the right side expression of Equation [1], Equation [6] is obtained:

$$Y_{ct} = [A_0 - A_4 B_0] + A_4 X_{pt} - A_4 B_1 Z_{1t} - A_4 B_2 Z_{2t}$$
$$- A_4 B_3 Z_{3t} + [A_1 - A_4] X_{1t} + A_3 X_{3t}$$
$$+ [V_t - A_4 U_t] \qquad [6]$$

Consequently, the price for crushing becomes a function of a set of variables affecting consumption of peanuts in both the edible and crushing markets. Equation [6] reflects this dependency.

The free market price, P_{et}, can be estimated from Equation [6] as follows:
Let both Y_{ct} and Z_{2t} equal P_{et}. Then, solve Equation [6] for P_{et} to obtain Equation [7]:

$$P_{et} = \frac{1}{1 + A_4 B_2} [A_0 - A_4 B_0] + A_4 X_{pt} - A_4 B_1 Z_{1t}$$

$$- A_4 B_3 Z_{3t} + [A_1 - A_4] X_{1t} + A_3 X_{3t}$$
$$+ [V_t - A_1 U_t] \qquad [7]$$

The reason for letting both Y_{ct} and $Z_{2t} = P_{et}$ is that, in the absence of any price support program, peanuts would have been traded for both edible and crushing uses without price differentials. In the free market, peanut supply would be adjusted such that a single price evolves for both uses. The equilibrium price thus obtain, P_{et}, is considered as the free market price.

Gross farm income, in the absence of support, was estimated by multiplying total amount of peanuts marketed with estimated free market price. The empirical counterpart for Equation [7] was obtained as follows: X_{st} in Equation [4] was replaced with the $[X_{pt} - Y_{et} - X_{1t}]$ expression from Equation [5] and Y_{et} was replaced with the right side expression of Equation [2]. Both Y_{ct} and Z_{2t} are then set equal to P_{et}.

Solving for P_{et}, Equation [8] is obtained:

$$P_{et} = 4.111404 - 0.388642 X_{pt} + 0.000509 Z_{1t}$$
$$- 0.012714 Z_{3t} + 0.16083 X_{1t} + 0.398313 X_{2t}$$
$$+ 0.904996 X_{3t} \qquad [8]$$

Effect of the Direct Peanut Price Support Program on Gross Farm Income

The change in gross farm income is the difference between actual gross farm income under the direct price support program and estimated farm income under the free market. During the period covered by this study, peanuts were traded on the commercial market at the prescribed price schedule set and enforced by the government.

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Peanuts which could not be sold were purchased by the government in accordance with the same price schedule. Thus, actual gross farm income was determined by the support price level set by the government and by the quantity of peanuts marketed.

Actual average price received by the grower was slightly different from average support price. The difference can be attributed, in part, to the quality of peanuts actually marketed. Because a quality factor was incorporated into the prescribed price schedule, actual price received was

Table 1. AVERAGE PRICE RECEIVED FOR EDIBLE AND CRUSHING USES AND ESTIMATED FREE MARKET PRICE OF PEANUTS 1952-1972

Marketing Year[a]	Price Per Pound				
	Support Price[b]	Received for Edible Uses[c]	Received for Crushing Uses[d]	Estimated Free Market Price[e]	Change in Price Received[f]
			—Cents—		
1952	12.0	10.9	7.2	6.8908	+ 4.0091
1953	11.9	11.1	6.5	6.0708	+ 5.0292
1954	12.2	12.2	7.2	7.1779	+ 5.0221
1955	12.2	11.7	5.6	5.1210	+ 6.5790
1956	11.4	11.2	5.5	5.3419	+ 5.8581
1957	11.1	10.4	5.2	5.6644	+ 4.7356
1958	10.7	10.6	5.0	4.6780	+ 5.9220
1959	9.7	9.6	5.3	5.1639	+ 4.4361
1960	10.1	10.0	5.1	5.1226	+ 4.8774
1961	11.0	11.0	5.0	5.6256	+ 5.2744
1962	11.1	11.2	5.0	5.5720	+ 5.4280
1963	11.2	11.2	4.8	5.2020	+ 5.9980
1964	12.2	11.2	5.6	5.2485	+ 5.9515
1965	11.2	11.4	5.7	5.0919	+ 6.3081
1966	11.35	11.3	5.5	5.8442	+ 5.4558
1967	11.35	11.4	5.0	5.0596	+ 6.3404
1968	12.01	11.9	5.0	4.9159	+ 6.9841
1969	12.38	12.3	5.8	4.8548	+ 7.4452
1970	12.75	12.8	6.6	5.2311	+ 7.5689
1971	13.42	13.6	6.2	5.6525	+ 7.9475
1972	14.25	14.4	8.0	7.1954	+ 7.2046

[a] Crop year and marketing year are used interchangeably. Both begin from August 1.

[b] Price at which peanuts were supported by the government.

[c] Average price received by farmer's for their peanuts.

[d] Price received by the CCC for peanuts sold for crushing uses.

[e] Free market price estimated by Equation [8].

[f] Difference between average price received for peanuts in edible uses and the estimated free market price.

higher than averge support price only when the quality of peanuts was better than the quality standard set in the price schedule.

When the average price received by the grower was regressed on average support price, over 91 percent of the variation in average price received was explained by the average support price. The unexplained portion accounts for less than 9 percent of the variation and the quality of peanuts marketed is partly responsible for the unexplained residuals.

From Equation [8], the equilibrium price, P_{et}, for a particular year was obtained by supplying data for the variables on the right side of Equation [8] for that year. Equilibrium price obtained was considered to be an estimate of the price that would have prevailed in the absence of the program.

The free market price was expected to be lower than average price received by growers and closer to the price received for crushing by the government. The average price received by the grower was determined by the support price level which has usually been set higher than the free market price level. Because the government sold peanuts in order to recover a part of the cost, rather than seeking full market price for peanuts held in storage, the result was some government loss each year per pound.

The free market price which would have prevailed is estimated in Table 1 for the crop years 1952 through 1972. Estimated price is between average price received by the grower and average price received by the government for crushing uses for most crop years.

Estimated free market price of peanuts is slightly higher or lower than the price of peanuts for crushing. This indicates that average price of peanuts under a free market would be close to the average price received by the government.

The effect of the program upon average price received by the grower, obtained by subtracting free market price from average price received, was also estimated in Table 1 for crop years 1952 through 1972.

The increase in price received by the grower ranged from a low of 4.01 cents to a high of 7.95 cents per pound. Average price received for edible uses was higher than estimated free market price in all years.

Estimated farm gross income under free market conditions (Table 2) for the crop years 1952

through 1972 indicates that actual gross farm income under the support program was higher than estimated gross farm income under a free market for all years. The estimated increase in gross farm income ranged from a low of 48.1 million dollars in 1954 to a high of 234.4 million dollars in 1972. Nearly one-half of actual gross farm income was because of support program during the past several years. Similarly, about one-half of average price received by the grower was a result of the support program. Thus, the program was an important factor in maintaining the price of peanuts and the gross farm income of growers at a level higher than would have prevailed under a free market.

EFFECT OF THE DIRECT PEANUT PRICE SUPPORT PROGRAM ON GOVERNMENT COST

Although gross farm income doubled through the program, it was costly to the taxpayer. Total cost over the period 1952 to 1972 amounted to 640 million dollars. It totaled over 434 million dollars for the period 1965 through 1972. Further, the cost does not include payments made by the government to reduce peanut production through production control programs, such as acreage diversion or acreage reserve. The cost of administering the program is also excluded.

Peanuts purchased and net loss to the Commodity Credit Corporation for the years 1952 through 1972 are shown in Table 2. During the period 1952 through 1972, CCC paid an average of 11.72 cents per pound when purchased peanuts were sold for crushing. Net loss to the government was, therefore, 5.37 cents on average.

Cost of the program is determined by the support price level set by the government and demand characteristics for peanuts on both edible and crushing markets. Because price elasticity on the edible market is inelastic, an increase in the support price level does not result in a proportionate decrease in amount of peanuts purchased. According to Equation [2] for edible peanuts, a one percent increase in support price level is expected to result in a 0.44 percent decline in quantity purchased by commercial interests.[2]

On the other hand, peanuts for crushing is price elastic. That is, an increase in quantity of peanuts purchased by the government and sold for crushing is not expected to lower the price

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[2] Price elasticity was evaluated at the mean of both Z_{2t} and Z_{3t}.

of peanuts for crushing proportionately. According to Equation [4], a one percent increase in amount of peanuts sold by the government for crushing can be expected to decrease the resale price of peanuts by only 0.167 percent.[3] Therefore, when the support price level is raised, the government purchases more peanuts and receives only a slight decrease in the resale price of peanuts for crushing. Although the quantity of peanuts purchased by the government has a slight downward influence on price of peanuts for crushing, it is not expected to decrease it as much as the increase in support price level, since price elasticity of peanuts on the edible market is 0.44, compared to 6.0897 on the crushing market.

Table 2. ESTIMATED IMPACT OF DIRECT PEANUT PRICE SUPPORT PROGRAM ON TOTAL FARM INCOME 1952-1972

Marketing Year	Total Farm Income Under Price Support Program[a]	Government Cost[b]	Estimated Total Farm Income in Free Market[c]	Net Change in Farm Income[d]	Ratio of Net Change in Income to Government Cost
			Million Dollars		
1952	142.245	4.8	89.928	+ 52.318	10.899
1953	169.164	14.0	92.522	+ 76.642	5.474
1954	116.876	e	68.765	+ 48.111	e
1955	175.149	17.1	76.661	+ 98.488	5.759
1956	174.832	20.2	83.389	+ 91.443	4.527
1957	144.352	6.1	78.616	+ 65.736	10.776
1958	187.514	21.2	82.754	+ 105.998	4.999
1959	141.888	11.4	76.324	+ 65.564	5.751
1960	167.600	16.7	85.862	+ 81.739	4.895
1961	176.144	12.1	90.916	+ 85.228	7.043
1962	184.470	21.2	93.442	+ 91.028	4.294
1963	212.912	28.3	98.890	+ 114.060	4.030
1964	242.368	30.5	113.588	+ 128.780	4.222
1965	267.330	44.3	119.407	+ 147.923	3.339
1966	268.601	43.8	138.912	+ 129.689	2.961
1967	278.274	48.2	123.515	+ 154.759	3.211
1968	299.285	38.8	123.637	+ 175.648	4.527
1969	307.746	36.0	126.472	+ 186.274	5.174
1970	377.984	66.3	154.471	+ 223.513	3.371
1971	405.416	97.3	168.486	+ 238.930	2.435
1972	468.432	60.6	234.053	+ 234.379	3.901

[a] Average price times the quantity sold.

[b] Net loss incurred in the purchase-and-resale operation by the CCC.

[c] Estimated free market price times the quantity sold.

[d] Difference between the average price received and the estimated free market price times the quantity sold.

[e] No peanuts were purchased by the Government in 1954. Due to heavy rain during the harvesting season the supply was short.

[3] $\dfrac{d\,Y_{ct}}{d\,X_{1t}}\dfrac{X_{1t}}{Y_{ct}}$ was computed holding other variables at their respective mean.

There is no optimal support price that will maximize farm income and minimize government cost. Support price must lie somewhere between the free market price and a price high enough to choke off the quantity demanded for edible uses. If the support price is set at the free market price, no government cost will be incurred. On the other hand, if the support price is set high enough, the government would have to purchase all of the peanut production.

In the crop year 1972, for example, the free market price is estimated at 7.19 cents per pound while the support price that would prevent the sale of any peanuts for edible uses is estimated at about 66.83 cents per pound. At a support price of 66.83 cents, all peanuts produced would be purchased by the government and be sold for crushing. The government would have received a price of 3.28 cents per pound for the peanuts resold for crushing.[4] Assuming that government supported the price at 66.83 cents a pound and sold for crushing uses only, cost to the government would be about 205.6 million dollars and farm income would rise dramatically.

IMPLICATIONS

This study indicates free market price would approximate the crushing price and that gross farm income of peanut growers was greater than would have prevailed under a free market. Further, the increase in gross farm income was higher than the government's cost of the program for peanuts for every year between 1952 and 1972. The average price received for peanuts by the grower was increased, on average, by 5.37 cents per pound compared to estimated free market price. Gross farm income was increased 112 percent by the program for the entire period. Moreover, each dollar spent by the government raised gross farm income an average of 4.05 dollars for the same period.

Establishing new price support levels is difficult because of conflicting policy criteria. If the program wants to emphasize increased farm income, the support price level will have to be set high relative to the free market price. If policy is aimed at low consumer food costs, the support price will have to be set at a price level closer to the free market price. If the policy emphasizes treasury cost reductions, the support price level will be set closer to free market price.

The support program, following the first policy, has been aimed primarily at increasing farm income. Thus, the net change in gross farm income has been high, as shown in Table 2. The increase in gross income per dollar of treasury cost each year ranged from a low of 2.96 dollars to a high of 10.78 dollars. The ratio of net farm income change as a result of the program has been estimated in Table 2. Although the program was costly to the government and to the taxpayer, the increase in gross farm income was a multiple of the government cost. In view of the first policy objective, the direct peanut support program may be said to be successful.

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[4] Computed using Equation [4] assuming all peanuts produced were used for crushing purposes.