THE EFFECT OF IMPORTATION ON THE PRICE OF RICE *

By

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When the Philippine government wants to subsidize consumers of a particular food, the classical method is to purchase quantities of it either from domestic farmers or from abroad, for resale to consumers at special prices. In the case of rice, the government has had an effective monopoly on importation but not on the retail supply. The great majority of consumers, who do not purchase their rice from the government but from private retailers, share in the consumer subsidy to the extent that the market retail price is lower than it would have been had the government not participated in the market as a competing retailer. It may be assumed that the presence of the government in the market shifts the demand curve facing private retailers to the left. It is clear that the government's expectation is that this should decrease the open market prices below the levels which would hold had it not entered the market.

The purpose of this paper is to cast doubt on the effectiveness of rice importation as a means of lowering the retail price of rice in the open market: (*a*) by presenting the importation and the price evidence for a period when one might have expected to find clear-cut price changes in the opposite direction from changes in importation levels; (*b*) by offering alternative theories to explain the "strange" data of the said period; and (*c*) by an attempt at a measurement of the net effect of importation on the retail price level over a longer time span encompassing the above period. The ability of the estimated equation to predict the average 1968 retail price level is then tested.

At this point I wish to set aside the problem of the effect on retail prices of government operations with respect to domestically produced rice, and concentrate instead on the effects of rice importations. It is far from clear whether domestic operations have any effect on the open market price at all unless the government is prepared for indefinite storage of domestically purchased rice: the government merely withdraws rice at the farmers' end and restores it to the market at the consumers' end, with no net effect on supply. Net effects on *demand*

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may come about via the gains in real income of those who have benefited from the government operations—the farmers who obtain a producer's subsidy and the consumers who buy government rice. It is possible for these real income gains to lead either to increased or to decreased consumer demand for rice, i.e., either rightward or leftward shifts in the demand curve, depending on whether rice is an inferior good or not. Thus, although domestic operations do benefit a good number of individuals, they may have negative, zero, or positive effects on the prices of private retailers, with the positive effects being not at all implausible.

Importations, on the other hand, represent clear additions to the *potential* retail supply of rice. They will bring about decreases in the market retail price, given the market demand curve, if the private retail supply is uninfluenced by them. A theory will be presented later in which the key element is a supply curve which reaches to importations.

Table 1 gives price, imports and output data from 1956 to 1967. Manila prices are used on the premise that, when government wishes to influence price via importation, it is more anxious to succeed in Manila than in any other single locality. The most interesting sub-period in this time span, to my mind, is 1960-1963. Imports were nil in 1960 and in 1962; and very large (by previous years' standards) in 1961 and in 1963. But the retail price of rice in Manila was *higher,* not lower, in 1961 and in 1963 than in 1960 and in 1962. (The price changes are even more striking when prices are undeflated.) This observation holds, in general, for all regions in the country for 1960-1963. In addition, one may note that the large import drop from 1958 to 1959 is associated with a price drop, and that the record imports of 1965 are associated with an increase in the retail price level. These observations do not seem to reconcile with standard theory.

THEORETICAL ANALYSIS

There are various situations which make it possible for the price of a good to fall when its demand curve shifts to the right, given that cost conditions in the firms in the industry are unchanged. It is relevant to the problem at hand to consider separately (1) cases of competition and monopoly and (2) the case of an unanticipated demand shift and the case of an anticipated demand shift.

It is not at all clear whether the rice retail trade in some or all of the major towns and cities in the Philippines is competitive or monopolistic. There are obviously a great number of apparently independent retailers. Very many of these apparently independent retailers also happen to be of Chinese descent; and the suspicion, valid or not, that these retailers band together to take advan-

tage of the Filipinos of "purer stock" is no doubt widespread. (One may note *Republic Act No. 3018,* which took effect on 1 January 1961 and provided that the rice and corn industries, including trade and processing, be completely nationalized by the end of 1963. It is doubtful, however, that this Act could have broken up a Chinese cartel.)

TABLE 1

	AVERAGE DEFLATED RETAIL PRICE OF MACAN 2ND CLASS IN MANILA, FOR THE CALENDAR YEAR [a]	NET MILLED RICE IMPORTS OF THE PHILIPPINES, FOR THE CALENDAR YEAR [b]	PHILIPPINE PALAY OUTPUT IN MILLED RICE EQUIVALENT, FOR THE CROP YEAR [c]	
CALENDAR YEAR	*Pesos/ganta*	*Thousand m. tons*	*Thousand m. tons*	CROP YEAR
1956	.8107	42	2125	1955/56
1957	.9406	78	2172	1956/57
1958	.9522	231	2079	1957/58
1959	.7533	6	2392	1958/59
1960	.8633	–2	2427	1959/60
1961	.8978	186	2405	1960/61
1962	.8251	0	2538	1961/62
1963	.8927	256	2575	1962/63
1964	.9676	299	2494	1963/64
1965	1.0020	560	2591	1964/65
1966	1.1314	108	2644	1965/66
1967	1.0855	237	2704	1966/67

[a] Original monthly averages are (unpublished) Central Bank data available from Prof. L. Mears' collection of data, identified as Table 19. These averages were then deflated by the Central Bank Consumer Price Index for Manila, adjusted to exclude rice; deflator available from Mears' data, Table 18. Then the deflated data were averaged, weighted by the 1956 Central Luzon harvest distribution, found in D. A. Maulit, "Palay Harvest and the Supply of Rice," *The Philippine Statistician,* 6:2 (June 1957).

[b] Data for 1956-1963 as revised and adopted by an Inter-Agency Committee of the government on 31 March 1965. Data for 1964-1966 from the Bureau of Census and Statistics, *Foreign Trade Statistics of the Philippines, 1964-1965-1966.* Available from Mears' data, Table 5.

[c] From the Department of Agriculture and Natural Resources' Crop and Livestock Surveys (only 1955/56 to 1958/59 are published). The 1966/67 figure is the 1 April 1967 forecast. Available from Mears' data, Table 1.

1. *UNANTICIPATED SHIFT IN DEMAND*

In the competitive case, a rightward shift of demand must increase price if the demand and supply curves have the usual slopes. But if there are economies of scale in the industry, so that the supply curve slopes downward and is less

steep than the demand curve [1], then the demand shift will decrease the price instead. This is one possible explanation for the price data recorded for 1960-1963.

In the case of monopoly, the addition to demand will decrease price if the monopolist is operating in the region where marginal cost is decreasing, if marginal cost is decreasing at a fast enough rate. This is another possible explanation.

2. *ANTICIPATED SHIFT IN DEMAND*

Theoretical explanations that require downward sloping cost curves or economies of scale seem inherently less credible than explanations that consider upward sloping cost curves and no special economies of scale even though evidence supporting these assumption is omitted. Explanations of the latter type are offered here. If firms in the industry have upward sloping cost curves, it is possible for an *anticipated* upward shift in demand to decrease price when the industry is competitive but not when it is monopolized. Since this analysis is not of the usual type I will discuss both cases.

It seems reasonable to assume that retailers have been able to anticipate that certain years find heavy competition from the government while others find almost no competition. First of all, government negotiations for imports are a public matter. Secondly, in the time span under study, one cannot help but note that 1961, 1963 and 1965 were all election years, and that for obvious reasons a party in power would have strong incentives to distribute large amounts of imported rice during such years, and weak incentives to do likewise during intervening years. Retailers may feel it to their advantage to withhold supplies from the market when competition from the government is strong, and wait for better times.

A. *THE CASE OF COMPETITION*

Suppose that the firms anticipate that the price of their product in odd-numbered years will be P_1, and that the price in even-numbered years will be P_2, greater than P_1. Refer to these years as Year 1 and Year 2.

Let $Q_1 + Q_s$ be total output in Year 1.
Q_1 is sold in Year 1.
Q_s is stored for sale in Year 2.
Let Q_2 be output in Year 2, for simplicity assumed to be entirely sold in Year 2.

The marginal cost function, excluding storage, is assumed the same in both years: $MC(Q_1 + Q_s) = MC(Q_2)$. The marginal storage cost function

[1] This requires taking Marshall's rather than Hicks' definition of stability.

(storage from Year 1 to Year 2) is MS (Q_s). The corresponding total cost functions are C and S respectively.

Assume that the competitive retailer maximizes his profits over both years, and ignore the rate of interest so as to avoid the maximization of present value complication. The retailer thus maximizes

$$\pi = P_1Q_1 + P_2(Q_2 + Q_s) - C(Q_1 + Q_s) - S(Q_s) - C(Q_2)$$

with respect to Q_1, Q_2, and Q_s. Obtaining first order conditions:

$$\frac{\partial \pi}{\partial Q_1} = P_1 - C'(Q_1 + Q_s) = 0$$

$$\frac{\partial \pi}{\partial Q_2} = P_2 - C'(Q_2) = 0$$

$$\frac{\partial \pi}{\partial Q_s} = P_2 - C'(Q_1 + Q_s) - S'(Q_s) = 0$$

The first condition equates P_1 to the marginal cost of producing Q_1 and Q_s together. This determines $Q_1 + Q_s$ at point E_1 in Figure 1. The second condition clearly determines Q_2 at point E_2 in the diagram. The third condition equates P_2 to the sum of the marginal cost of producing $Q_1 + Q_s$ and the marginal cost of storage Q_s. Therefore $P_2 - P_1$ is the marginal storage cost at the retailer's optimum. In the diagram the marginal storage cost function is a straight line for the sake of simplicity. The distance E_1B is the optimal marginal storage cost according to the third condition for profit maximization. Draw a line from point B parallel to MS (Q_s) and ending where the distance O'A' equals the distance OA, i.e., shift the MS (Q_s) curve upwards to a new axis with origin at point O'. Then point O' indicates the optimal level of Q_1 and the distance $O'E_1$ is the optimal level of Q_s.

In this model the retailer offers for sale the quantity CO' in Year 1 and the quantity $DE_2 + O'E_1$ in Year 2, because he anticipates $P_2 > P_1$. He offers less in Year 1 and more in Year 2 than if he had no such anticipation. We can take all possible (P_1, P_2) combinations that a retailer can anticipate, where for every combination P_2 is greater than P_1, say by a constant. For every P_1 in this list of combinations the model will determine Q_1 at a level less than that indicated by the intersection of the P_1-price line and the marginal cost curve, and for every P_2 in the list of combinations the model will determine $Q_2 + Q_s$ at a level greater than that given by the intersection of the P_2-line and the marginal cost curve. This implies that the relevant supply curve for Year 1 will be to the left of and the relevant supply curve for Year 2 will be to the right of the curve given by the summation of the marginal production cost curves over all retailers

In Figure 2, the relevant Year 1 and 2 supply curves are S_1 and S_2 respectively; the demand curves are D_1 in Year 1 and D_2 in Year 2, since govern-

ment participation decreases by assumption from Year 1 to Year 2. Since S, the ordinary supply curve in the absence of economies or of diseconomies, must lie between S_1 and S_2, P_1 must be greater than and P_2 must be less than the corresponding prices that would hold in the absence of anticipations, namely P_1^* and P_2^* in the diagram. This conclusion also holds for the anticipations model in the case of monopoly (*v.* next section). It may sometimes be—and this depends on the position of the marginal storage cost curve — that S_1 and S_2 are so far away from S that P_2, say, the non-election year price, will be less than P_1, say, the election year price. Figure 2 illustrates this case, which, as the next section will show, will not be possible in the case of monopoly. This case is a third possible explanation for the 1960-1963 retail price data.

B. *THE CASE OF MONOPOLY*

Suppose there were a retail cartel instead, so that each retailer faces a downward sloping demand curve, his share of the industry demand curve. Assume he anticipates a rightward shift in his demand curve, from $P_1=f(Q_1)$ to $P_2=g(Q_2+Q_s)$, as Year 1 passes to Year 2. P_1, P_2, Q_1, Q_2, Q_s, C, S, MC and MS are as previously defined except that in this case P_1 and P_2 are set by the retailer. Again assume that the retailer maximizes profits over two-year periods, i.e., he maximizes

$$\pi = f(Q_1),\ Q_1 + g(Q_2 + Q_s).\ (Q_2 + Q_s) - C(Q_2) - S(Q_s)$$

with respect to Q_1, Q_2, and Q_s:

$$\frac{\partial \pi}{\partial Q_1} = Q_1 \cdot f'(Q_1) + f(Q_1) - C'(Q_1 + Q_s) = 0$$

$$\frac{\partial \pi}{\partial Q_2} = (Q_2 + Q_s) \cdot g'(Q_2 + Q_s) + g(Q_2 + Q_s) - C'(Q_2) = 0$$

$$\frac{\partial \pi}{\partial Q_s} = (Q_2 + Q_s) \cdot g'(Q_2 + Q_s) + g(Q_2 + Q_s) - C'(Q_1 + Q_s) - S'(Q_s) = 0$$

These conditions can be written

$$(1)\ MR(Q_1) = MC(Q_1 + Q_s)$$
$$(2)\ MR(Q_2 + Q_s) = MC(Q_2)$$
$$(3)\ MR(Q_2 + Q_s) = MC(Q_1 + Q_s) + MS(Q_s)$$

where MR (Q_1) is marginal revenue from Q_1 as given by the demand curve of Year 1, and MR (Q_2+Q_s) is marginal revenue from Q_2+Q_s as given by the demand curve of Year 2.

It will always be true that P_2 will be greater than P_1, provided that marginal storage costs are positive. The first and third profit-maximization conditions can be combined to give

$$MR(Q_2 + Q_s) = MR(Q_1) + MS(Q_s)$$

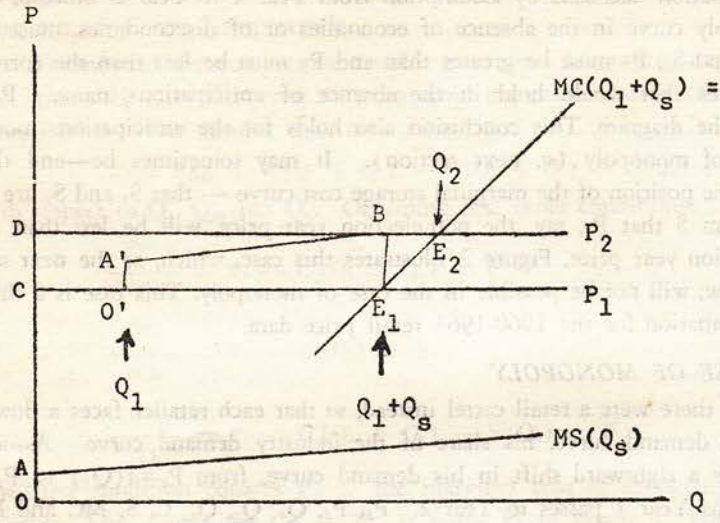
P
MC(Q1+Qs) = MC(Q2)
Q2
B
D
P2
A'
E2
C
P1
O'
E1
Q1
Q1+Qs
MS(Qs)
A
O
Q

Fig. 1

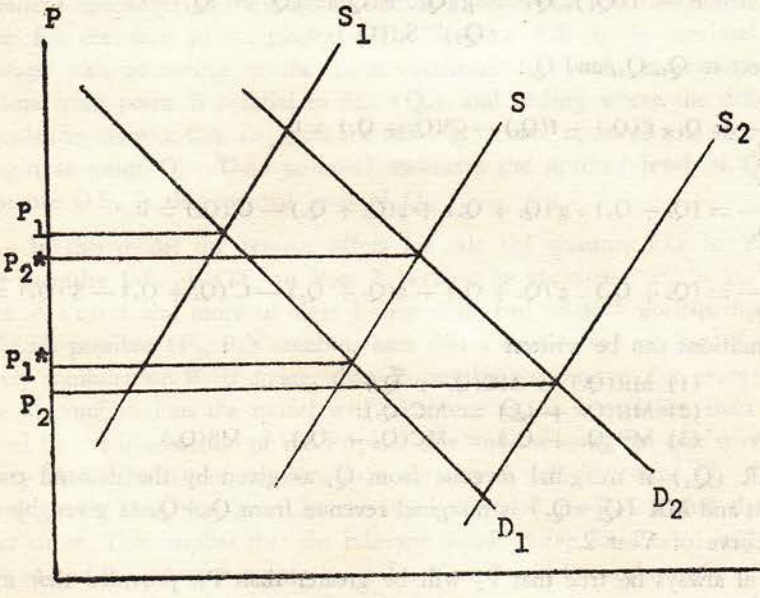
P
S1
S
S2
P1
P2*
P1*
P2
D2
D1
Q

Fig. 2

This implies that at the optimum point the level of marginal revenue must be greater in the second year than in the first. Since in the second year the demand curve facing a retailer is above and to the right of the demand curve in the first year, the price set in the second must be greater than that in the first. This is true whether the marginal cost curve applicable to both years is upward or downward sloping. Intuitively, a monopolist or a cartel member who anticipates shifts in the degree of government participation in the two-year situation realizes that storing part of his produce in Year 1 for sale in Year 2 will decrease, *cet par.*, the price at which he can sell both his stored output and his Year 2 output. At the optimum point he will not store so much as to force himself to sell at P_2, less than P_1. Therefore, although this model does imply a weaker impact of imports on the current price level than the standard model, it does not explain the 1960-1963 price data.

A TEST OF THE ANTICIPATIONS HYPOTHESIS, 1956-1967

The main implication of the anticipations models, both of competition and monopoly, is that competition from the government in the rice retail market is less effective in lowering the current retail price level than would be expected using standard theory. The main difference between the cases of competition and of monopoly is that the anticipations model in the former case allows instances in which the retail price is greater when imports are large than when they are small, whereas in the latter case it does not.

A test of the anticipations hypothesis has been made in the following manner. A competitive model allowing for the possible anticipations effect was specified:

$$(1)\quad M_t = \alpha_0 + \alpha_1 P_t + \alpha_2 t + u_{1t} \qquad \text{Demand}$$

$$(2)\quad M_t = \beta_0 + \beta_1 P_t + (1 + \beta_2) I_t + \beta_3 Q_t + u_{2t} \qquad \text{Supply}$$

where M_t is the quantity marketed, P_t is the retail price level, t is time in years (proxy to account for population and real income growth), I_t is imports, Q_t is domestic output and the u's are stochastic error terms. Total supply is the sum of domestic and imported supplies; $\beta_2 \neq 0$ allows for I_t to have a possible effect on *domestic* supply. Under the anticipations model, $\beta_2 < 0$, making the coefficient of I_t in the supply function close to zero or even negative.

The reduced equation for P_t is

$$(3)\quad P_t = \text{Const.} + \frac{1 + \beta_2}{\alpha_1 - \beta_1} I_t + \frac{\beta_3}{\alpha_1 - \beta_1} Q_t - \frac{\alpha_2}{\alpha_1 - \beta_1} t + v_t$$

with I_t, Q_t and t all being exogenous from the viewpoint of the current price level. The denominators of their coefficients are all a priori negative, since a_1 is the demand price coefficient and β_1 the supply price coefficient. The a priori sign of the reduced coefficient of Q_t is therefore negative and that of t is positive.

The sign of the reduced coefficient of I_t is negative if the anticipations hypothesis does not apply ($\beta_2=0$), and is either negative (but small) or positive if the hypothesis does apply. By an earlier argument, the sign may (not must) be positive if competitive is the case but not if monopoly is the case. It must be admitted that the form of equation (3) in itself does not positively identify the model from which it sprung as either one of competition or one of monopoly. An estimated coefficient which is positive is evidence in favor of competition; one which is negative will not discriminate between competition and monopoly.

Since the rice industry is partly a subsistence sector, not all of an increment in domestic output becomes an increment in the marketable surplus, i.e., $\beta_3<1$ a priori. So if the anticipations model does not apply, I_t's reduced coefficient must be a larger negative than Q_t's reduced coefficient, viz., under the standard model one expects an increase in the importation level to have a *greater* depressing effect on price than an equal increase in domestic output. This comparison of coefficients is a critical element in the test of the model, for if, empirically, the reduced coefficient of imports appears to be a *smaller* negative than that of output, then it may be concluded that the imports coefficient meets the criterion of "smallness" required by the anticipations model.

Using all the data in Table 1, altering the units of the variables a bit, a regression of P_t on I_t, Q_t, t and a constant term gives reasonably good fit:

$$(4)\quad P_t = 281.5 - 1.536\, I_t - 9.735\, Q_t + 7.727\, t$$
$$\qquad\qquad\qquad\quad (1.448) \quad (2.767) \quad (1.757)$$

$$R^2 = 811$$

Durbin-Watson statistic = 2.270[2]

where P_t is in centavos/ganta,

I_t and Q_t are in units of 100,000 m. tons, and

$t = 1$ stands for 1956.

The coefficients of Q_t and t have the right signs, and are significant at the 1% level; their partial correlation coefficients are —.78 and .84 respectively. The coefficient of I_t is negative but not significantly different from zero; neither is it significantly different from + 1.0 at the 10% level, so a null hypothesis that it is positive cannot be rejected either. Its absolute size is small: an increase in importation by 200,000 metric tons implies a decrease in the retail price level of only approximately ₱0.03/ganta. Whereas an

[2] Critical values are available for $n \geq 15$. For $n = 15$, at the 5% level for 3 independent variables, $d_L = .82$ and $d_U = 1.75$. Judging from Durbin's and Watson's graph of 5% values of d_L and d_U for $15 \leq n \leq 100$. (*Biometrika*, June 1951, p. 162, at $n = 12$ the hypothesis of no serial correlation may be accepted against an alternative of positive serial correlation; the test is inconclusive if the alternative hypothesis is that serial correlation is negative.

increase in domestic output by the same magnitude implies a decrease in the retail price level of approximately ₱0.19/ganta. The hypothesis that the true coefficients of I_t and Q_t are of equal size is rejected at the 1% level, so *a fortiori* the hypothesis that I_t's coefficient is a larger negative, i.e., the standard model, is also rejected.

The regression equation predicts the direction of change of P_t correctly in all years but 1965. In this year of record-size imports, P_t *ought* to have fallen from the 1964 level, but it did not. An interesting implication of the equation is that, given $I_t = 0$, the necessary yearly increase in Q_t such that P_t is unchanged ("stabilized") is roughly 80,000 metric tons of milled rice.

The conclusion is that the regression gives firm support to the anticipations hypothesis: importations over 1956-1967 have not had, in comparison with domestic output, a significant effect on the retail price level. But there is no added evidence in favor of either the competition or monopoly variants, besides the data for 1960-1963.

FORECAST OF THE AVERAGE 1968 PRICE LEVEL

A regression equation is more useful if it can predict future events as well as rationalize past ones. The current outlook of the rice industry is quite optimistic, and the possibility of exportation, rather than importation, is a concern of the government. Another policy the government appears to be considering is indefinite storage of part of domestic production (to be interpreted here as a decrease in Q_t, the total current output available to the market) in the interest of farm price support. For both these policies some forecast of the net effect on the retail price level is required. This section treats a test of the consistency of equation (4) with partial data for 1968.

Table 2 gives monthly values of the price index and non-deflated as well as deflated rice prices for the first half of 1968. The alternative forecasts of the 1968 average (January-December) current retail price which follow all assume that the average 1968 price index level is 152.

Since the government is exporting rice this calendar year, let us set $I_{13} = 0$ and then forecast P_{13} given alternative levels of Q_{13}, bearing in mind that the forecasts will be *under*-estimates to the extent that I_{13} is in fact negative. (Note that $t = 13$ refers to calendar year 1968 in the cases of P_t, I_t and t, and refers to crop year 1967/68 in the case of Q_t; thus equation (4) actually incorporates a six-month lag). The palay stock under government control increased substantially over the last crop year[3], making Q_{13}, total 1967/68

[3] The palay stock of the Rice and Corn Administration increased from 1.5 million cavans (end of 1966/67) to 10.3 million cavans (end of 1967/68) according to the *Preliminary Report on RCA Operations, FY 1967/68*, RCA, Quezon City (prepared approx. August 1968), p. 1. It thus seems appropriate to estimate Q_{13} by subtracting about 10 million cavans of palay from the estimate of total output.

output available to the market, less than total 1967/68 palay output by roughly 10 million cavans of palay (about 285,000 metric tons of milled rice).

TABLE 2

	AVERAGE UNDEFLATED RETAIL PRICE OF MACAN 2ND CLASS IN MANILA DURING 1968 [a]	CENTRAL BANK CONSUMER PRICE INDEX (RICE EXCLUDED) [a]	AVERAGE DEFLATED RETAIL PRICE OF MACAN 2ND CLASS IN MANILA DURING 1968
	Pesos/ganta	*1955 = 100*	*Pesos/ganta*
January	1.75	154.4	1.137
February	1.72	151.5	1.135
March	1.70	150.7	1.128
April	1.70	150.2	1.132
May	1.70	150.8	1.127
June	1.70	152.8	1.113

[a] Same sources as in Table 1.

The alternative levels of Q_{13}, taken roughly, correspond to:

(a) The 1 April 1968 forecast of total *output* of the Bureau of Agricultural Economics [4] — 99 million cavans palay

(b) Total *output* according to a recent official release [5] — 108 million cavans palay

(c) Total *output* as estimated by the Rice and Corn Production Coordinating Council [5] — 118 million cavans palay

It bears repeating that each of the above levels can be used (1) to forecast the 1968 price level, *implying that total output is about 10 million cavans more*, or (2) to estimate what the 1968 price level would be if the government left the policy of withholding part of total output from the market, presuming that the estimate of total output is correct.

In case (*a*),

$$Q_{13} = 28.21 \text{ (hundred thousand metric tons milled rice)}$$
$$P_{13} = 281.53 - 1.536(0) - 9.735(28.21) + 7.727(13)$$
$$= 107.33 \text{ (centavos/ganta)}.$$

Standard error of forecast = 6.839.

[4] Same source as output data in Table 1.

[5] *The Philippine Food Production Program* (a presentation by Hon. Rafael M. Salas, Executive Secretary and Action Officer, Total Food Program, to Director-General A. H. Boerma, U.N. Food and Agriculture Organization), undated (made public on 28 October 1968), p. 11.

The associated forecast interval, at the 95% level, is (91.56, 123.10). Since the measure of P_t is relative to 1955 price levels, the forecast and forecast interval need to be inflated by the same price index used to arrive at 1956-1967 values of P_t. Taking 152 as the 1968 price index level, the 1968 forecast in terms of current prices consists of (in pesos/ganta):

1.871 = upper bound of 95% interval
1.631 = point estimate
1.392 = lower bound of 95% interval.

In case (*b*),

$Q_{13} = 30.84$
$P_{13} = 81.72$ (centavos/ganta)
Standard error of forecast = 8.971.

In current price terms, using 152 again as the price index level, the 1968 forecast is (in pesos/ganta):

1.557 = upper bound of 95% interval
1.242 = point estimate
.928 = lower bound of 95% interval.

In case (*c*),

$Q_{13} = 33.70$
$P_{13} = 53.88$ (centavos/ganta)

In current prices, the 1968 forecast is (in pesos/ganta):

1.359 = upper bound of 95% interval
.819 = point estimate
.279 = lower bound of 95% interval.

In case (*a*), we suppose that total palay output in 1967/68 was about 109 million cavans of palay, of which about 10 million were withheld by the government from the market. The forecast range is from ₱1.39/ganta to ₱1.87/ganta. This seems the most consistent, of the three (3) cases, with the run of prices during 1968 thus far (Table 2). The forecast interval of case (*b*) indicates that, if total palay output in 1967/68 was 118 million cavans of palay, the retail prices in July-December would have to be far lower than those of January-June, in order that a mean for the year of about ₱1.24/ganta be obtained. The forecast interval of case (*c*) seems quite unattainable in 1968, and should be treated as simply suggestive of price levels that would obtain if 118 million cavans of palay were available to the market.

POSTSCRIPT

The above study was completed in October 1968. New data now permit a check on the accuracy of the retail price forecast made in the last section. The following is a continuation to Table 2:

	Average undeflated retail price of Macan in Quiapo, Manila during 1968 [a]	Central Bank Consumer Price Index (rice excluded) [b]	Average deflated retail price of Macan in Quiapo, Manila during 1968
	Pesos/ganta	*1955=100*	*Pesos/ganta*
July	1.63	153.8	1.*63
August	1.64	156.0	1.048
September	1.56	159.9	.977
October	1.55	161.4	.962
November	1.53	160.3	.956
December	1.56	158.4	.984
Weighted [c] Average, 1968	1.606		1.021

[a] Daily price data made from the *Agricultural Marketing News Service*, Bureau of Agricultural Economics. Subgrades of the variety Macan are not distinguished.

[b] The adjustment to exclude rice from the Central Bank Consumer Price Index uses the price data in col. 1. The base year (1955) price level used is ₱0.91/ganta, which is the average for that year for Macan 1st and 2nd classes combined. Source of 1955 price data: Central Bank of the Philippines (unpublished).

[c] *V.* footnote [a] of Table 1.

Let us turn to forecast (*a*), which was felt to be the most reasonable of the three. The point forecast was ₱1.073 in real terms, with a standard error of forecast of ₱0.06.8. The actual average 1968 price level was ₱1.021 in real terms, *within one standard error of the forecast.* (It is slightly disappointing to find the forecast is not an underestimate as was expected). In nominal terms, the point forecast was ₱1.631, while the actual level was ₱1.606. The forecast error in real terms was to some extent offset by an underestimate of the level of inflation (rice excluded)—the deflator used was 152, whereas the actual implicit deflator for 1968 is about 157.

It may be emphasized that the forecast was *ex ante* in nature both in the sense that it was based on parameter estimates using pre-1968 data and in the sense that it was made before the end of 1968. There seems to be no stronger test of the ability of a model to forecast than a comparison with *ex post* data such as was just made.[6]

[6] For a sobering survey of the forecasting achievements of econometric models, *v.* H. O. Stekler, "Forecasting with Econometric Models: An Evaluation," *Econometrica*, 36:3-4 (July-October 1968), 437-63.