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ESTIMATES OF THE TASK OF RICE PRICE STABILIZATION
IN THE PHILIPPINES, 1969-1974

by

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by *Mahar Mangahas*

1. THE SETTING

There is little need to call attention to the great impact that the new varieties of rice, especially those developed in the Philippines, have made on rice production in Asia in the last few years. It was clear from the last session of the FAO Study Group on Rice that many Asian countries have shifted their concern from the production -- population race to the search for export markets and the tempering of price "volatility".¹

In the Philippines the emphasis has passed from ensuring a minimum per capita consumption of rice to supporting a minimum farm price level, with implications for both domestic and international policy. It appears certain that over the next few years a substantial part of output will have to be shunted away from the domestic market in order to maintain farm prices. The government, anxious that as much of this as possible be diverted to the export market, took the lead in the export expansion movement at the Study Group session, and made several proposals:

¹See Documents from the 13th Session, FAO Study Group on Rice, Manila, March 20-27, 1969.

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(1) that a "consultative rice council", equally composed of exporting and importing countries, be established; in this connection it was hoped that the competition from concessional sales (reference here to certain exports of Japan and the United States) would be minimized by the adoption of some code of behavior;

(2) that an international price stabilization mechanism be established, with given minimum and maximum prices set for a definite future period, say 6 months to a year, with certain actions to be automatically taken when the price level falls outside the acceptable range;

(3) that an international payments arrangement (one that would conserve convertible currencies) be established;

(4) that an international buffer stock of 10-15% of world trade be established;

(5) that rice be included as a commodity in international food aid.²

² See "International Action on Rice: A Philippine Proposal," 13th Session, FAO Study Group on Rice, Document CCP: R1 69/CRS/10. The Philippine delegation also expressed a willingness to support these proposals on a regional or sub-regional basis.

2. TRADITIONAL ANALYSIS

If a large enough export market is not found, then government must purchase part of domestic output for indefinite³ storage in order to support the farm price, given that the price level consistent with total output is unacceptably low. A first indication of the possible magnitude of these operations is given by government forecasts of output and of "requirements" for 1968/69 to 1973/74, found in Table 1 and Fig. 1.

The forecast for output, Q , is a sustained rapid growth throughout the period at the rate of about 11% annually. (This is about the same as the actual growth of crop year 1968 output over crop year 1967). This pattern is based mainly on a projected rapid increase in average irrigated yields, viz., a yield of 70 cavans⁴ /ha. for 1970/71, increasing by 10 cavans annually up to the end of the period. Thus it is probably not inaccurate to term the forecast path as also a target path. Continued rapid diffusion of the new high-yielding varieties is presupposed, and the projected increase in aggregate hectarage is not large.

³ Domestic purchase operations may have little effect on the open market price if government merely withdraws rice at the farmer's end and restores it at the consumer's end, with no net effect on supply, unless there are significant changes in demand due to the income changes of those who benefit from subsidy operations.

⁴One cavan = 44 kg. rough rice.

Table 1. Government forecasts of rice output, requirements, stocks and exportable surpluses, 1968/69-1974/75, Philippines

| In thousand m. tons milled rice | | | | | | | |
|---------------------------------|-------------------|--|-----------------------|---------------|---------------------|-----------------------------------|----------------------------------|
| Crop Year | Output Q | Relative Change in Output (%) $\Delta Q/Q$ | Beginning Stock K_1 | Requirement R | $Q + K_1 - R = K_2$ | Buffer and ending stock $.1Q = B$ | Exportable Surplus $K_2 - B = X$ |
| 68/69 | 3260 ^a | 11.0 | 597 | 3322 | 536 | 326 | 210 |
| 69/70 | 3652 ^a | 11.2 | 326 | 3436 | 542 | 365 | 177 |
| 70/71 | 3910 | 10.7 | 365 | 3594 | 680 | 391 | 290 |
| 71/72 | 4216 | 10.8 | 391 | 3727 | 880 | 422 | 458 |
| 72/73 | 4531 | 10.7 | 422 | 3865 | 1088 | 453 | 634 |
| 73/74 | 4855 | 10.7 | 453 | 4008 | 1299 | 485 | 814 |
| 74/75 | 5188 | 10.7 | 485 | 4561 | 1517 | 519 | 998 |

^aLower bounds of forecast interval.

Source: Philippine Technical Working Group (13th Session, FAO Study Group on Rice, Manila, March 20-27, 1969), International Action on Rice, vol. II: Background Papers, Charts and Tables, pp. 55-56. A weight conversion ratio of .675 was applied to original data, which were in terms of rough rice.

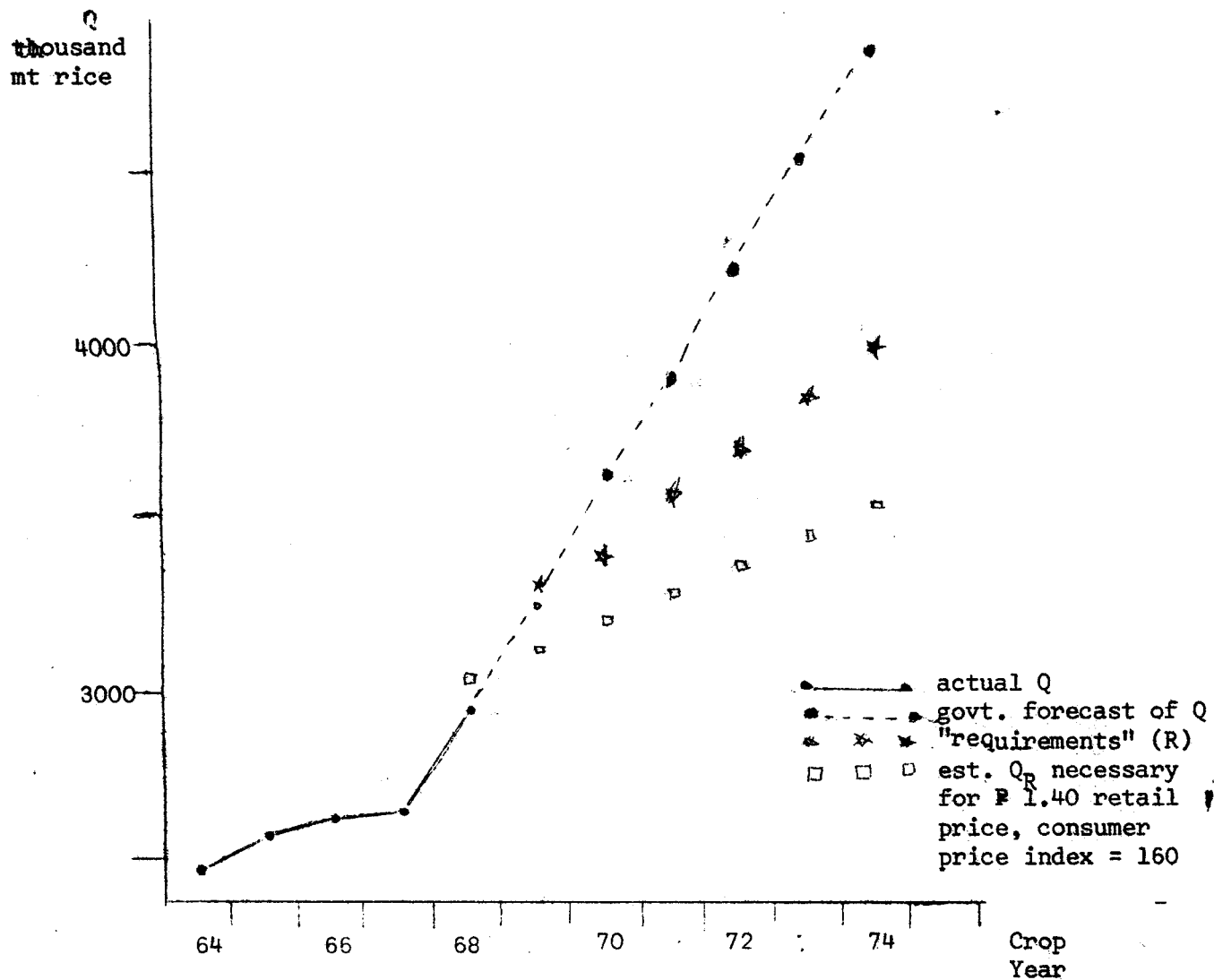


Fig. 1

Table 2

| Calendar Year | Average deflated retail price of Macan 2nd class in Manila, for the calendar year. ^{a/} | Net milled rice imports of the Phil- ippines, for the calendar year. ^{b/} | Philippine palay output in milled rice equiva- lent, for the crop year. ^{c/} | Crop Year |
|------------------|---|---|--|--------------|
| | Pesos/ganta | Thousand m. tons | Thousand m. tons | |
| 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 | 234 | 2657 | 1966/67 |
| 1968 | 1.0211 | -45 | 2960 | 1967/68 |

^{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). July - December 1968 data are from the Bureau of Agricultural Economics.

^{b/} Data for 1956-1963 as revised and adopted by an Inter-Agency Committee of the government on March 31, 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. Data for 1967 and 1968 are from the Rice and Corn Administration.

^{c/} From the Department of Agriculture and Natural Resources' Crop and Livestock Surveys (only 1955/56 to 1958/59 are published). Available from Mears' data, Table 1, except for 1966/67 and 1967/68.

Requirements, R , are on the other hand projected to grow at from 3.5 to 4 per cent annually. The projection is based on forecasts of the rice-eating population (growing nearly 3.5% yearly), per capita consumption levels for a base year (1959), and allowances for waste, feed, and seed (estimates are proportional to output, hectarage, or human consumption).

Rice import and export policy since 1959 has been based on estimated deviations in total supply (output plus beginning stocks, K_1) from a so-called "requirement" or "self-sufficiency level" (human consumption, based on 1959 per capita levels, and allowances) plus a desired buffer stock, B .⁵ The implied exportable surplus⁶, X , is computed in Table 1 as growing from 210,000 tons in 1968/69 to nearly a million tons in 1974/75. Thus, considering all these forecasts, it may already be concluded that the maintenance of a domestic support price of about \$150 per m. ton⁷ of milled rice will impose a tremendous burden on government unless substantial export markets are found. An alternative procedure, presented below, may provide a more accurate indication of the task, and, indeed, will suggest that the task may be even larger than it already appears.

⁵This method of course subjects the residual to much greater estimation error than either supply or requirements. A forthcoming study by the author, "Towards More Efficient Formulation of Rice Import/Export Policy", will discuss this method extensively and suggest an improvement.

⁶Exports are subject to government licensing.

⁷In the discussion following it will be convenient to use ₦1.40 per ganta retail as the support price. Using the conversion: one ganta = 56/23.5 kg., then the price per m. ton is ₦586, or \$150 at the exchange rate ₦3.9 = \$1.

3. AN ALTERNATIVE

An important deficiency in the use of the current method for price stabilization guidelines is the absence of information on the effects of changes in output, local demand and imports/exports on the price level. This may be remedied via a model⁸ which has been reasonably successful in predicting the retail price level (Macan variety, Manila):

$$(1) \quad M_t = a_0 + a_1 P_t + a_2 t + u_{1t} \quad \text{Demand}$$

$$(2) \quad M_t = b_0 + b_1 P_t + b_2 I_t + b_3 Q_t + u_{2t} \quad \text{Supply}$$

where M_t is the quantity marketed, P_t is the retail price level (calendar year average), t is time in years (proxy for population and real income growth), I_t is total imports and Q_t is total domestic output (crop year). A type of six-month lag is thus assumed between output and the retail price. This gives a reduced equation,

⁸This model was introduced in a previous article, "The Effect of Importation on the Price of Rice," The Philippine Review of Business and Economics, December 1968. The rationale for separate coefficients for I_t and Q_t is contained in a theory of retailer behavior involving anticipation of government competition. The estimate of the reduced equation for 1956-1967 data (previous to small revisions for 1967) is $P_t = 281.5 - 1.536I_t - 9.735Q_t + 7.727t$ ($R^2 = .81$). The new estimate therefore continues to support the conclusions drawn from the previous estimate, in particular that importation was a relatively ineffective means of price control.

Clearly I_t and Q_t should represent levels available to the market, and this may be presumed for 1956-1967 levels of imports and outputs. However, large addition to RCA stocks, coming mainly from domestic procurements, was made over crop year 1967/68. The figure for Q for this year (Table 2) is an estimate of the net available domestic supply. See ibid.

$$(3) P_t = \text{const.} + c_1 I_t + c_2 Q_t + c_3 t + v_t$$

which is estimated, using the data for 1956-1968 in Table 2, by

$$(4) P_t = 250.4 - \frac{1.688 I_t}{(1.369)} - \frac{8.254 Q_t}{(2.516)} + \frac{7.013 t}{(1.633)}$$

$$R^2 = .794, \quad DW = 2.131.$$

where P_t is in centavos/ganta (1955 prices), I_t and Q_t are in units of 100,000 m.tons, and $t = 1$ stands for 1956.

Eq. (4) implies: (a) given no change in I or Q , the effect of passage of one year (population and real income growth) is to increase P by about 7 centavos per ganta; (b) in order that P be kept constant over a succeeding year (stabilized) without resorting to imports ($I = 0$), the necessary increase of Q over the preceding crop year is estimated at

$$\Delta Q_R = \frac{7.013}{8.254} \times 100,000 = 85,000 \text{ m.tons.}$$

If this increase is actually met, then it may be presumed that the nation has preserved the "degree of self-sufficiency" which obtained in the preceding period. For if, at a given price level, the per capita quantity demanded increases due to population and real income growth, and if the price level then remains unchanged, then per capita consumption of rice cannot have decreased.

Note that the estimated necessary increase in Q is much less than the increase in the estimated annual "requirement" (Table 1); this estimated increase is 114,000 m.tons in 1969/70 over 1968/69, and is even larger for years farther off.

Since the Rice and Corn Administration is required by law to sell rice at a current price per ganta within the range (P 1.00, P 1.40)⁹, let us assume that the stabilization objective is to maintain the market retail price at P 1.40¹⁰ in current terms, and that the relevant general price index level is 160 (approximately 157 in 1968). Then, for a real price level $P = (1.40/1.60)$, and $I = 0$, eq. (4) implies that the required levels of output, Q_R , over certain years of interest are:

| <u>Crop year</u> | <u>Q_R in 10^5 m.t.</u> |
|------------------|---|
| t = 13 1967/68 | 30.5 |
| t = 14 1968/69 | 31.4 |
| t = 15 1969/70 | 32.2 |
| t = 16 1970/71 | 33.0 |
| t = 17 1971/72 | 33.8 |
| t = 18 1972/73 | 34.7 |
| t = 19 1973/74 | 35.6 |

⁹The actual RCA retail price at present is P 1.40.

¹⁰Let g = the number of gantas in a 56 kg. sack of milled rice, m = the number of 56 kg. sacks of rice obtainable from a 44 kg. cavan of rough rice, and s = the excess of marketing and processing costs (profit included) over the value of milling by-products. Let P_f be the farm price per 44 kg. cavan and P_r be the retail price, per ganta. Then $P_f = gm(P_r) - s$. Since the range of g is approximately (23.5, 24) and that of M is (.52, .57), then the range of (gm) is (12.2, 13.7). For $P_r = 1.40$, P_f has the range (17.1 - s , 19.2 - s). This range is consistent with the RCA minimum purchase price for rough rice, namely P 16 per 46 kg. sack.

These levels of Q_R are indicated on Fig. 1 by small boxes, and are seen to be much less than R , the differences being of the order of 200,000 m.t. in earlier years and rising to about 400,000 m.t. in later years. (In the case of 1968, it is seen that Q_R is greater than the available supply. The average price level for that calendar year was ₱ 1.61.) Thus the empirical analysis indicates a much greater farm support problem than the analysis currently in use. Conversely, it indicates a much easier task of defending consumer prices.¹¹

If the output forecasts are not exceedingly over-optimistic, the Philippine government will therefore be forced to shoulder a heavy burden from domestic purchases and explorations for outside markets, if it is to maintain the maximum government retail price. With this objective, the quantity of rice required to be removed from the domestic market may be estimated by the forecasted increase in output less the necessary increase in output.¹² The forecast increase in potential supply is 300,000 m.t. in 1968/69 and ranges from 258,000 to 392,000 m.t. in the rest of the period. The necessary increases in available supply on the other hand may be estimated by the differences

¹¹The usefulness of the suggested analysis may be tested by taking forthcoming data for 1969, interpreting Q as total national output (for July 1968 - June 1969) less the net addition to government stocks over the period, forecasting P from eq. (4) and comparing it to actual P after adjustment for inflation. It should be noted that, previous to 1967/68, government made no significant additions to its stocks from local procurements.

¹²Estimation error is considerably reduced by using changes instead of absolute values.

between Q_R for that year and the available supply for the preceding year. For 1968/69, this is $31.4 - 29.6 = 1.8$ hundred thousand m.t.; for succeeding years, assuming that available supply is limited to Q_R , the necessary increase is estimated by ΔQ_R , or 85,000 m.t. per year. Hence the estimated quantity of rice required to be removed, such that the market retail price be supported at ₱ 1.40, is 120,000 m.t. for 1968/69, and ranges from 173,000 to 307,000 m.t. during the rest of the period. At the support price of \$150 per metric ton, the implied purchase values are \$18 million for 1968/69, and range from \$26 to \$46 million for the rest of the period.

If the combination of export and government market is not as large as this, then price decreases will not be avoided, leading to a redistribution of part of the gains from technological change from producers to consumers. Shifts of hectarage away from rice may then be expected to follow¹³, with a resulting dampening in the time path of output. This analysis suggests that the potential for consumer gain from technological change in agriculture is greater in developing countries than in developed ones, in spite of a policy which favors producers, because of the larger burden of farm support relative to total government resources.

¹³ See M. Mangahas, A.E. Recto. and V.W. Ruttan, Market Relationships for Rice and Corn in the Philippines, forthcoming (1969) as Technical Bulletin No. 8, International Rice Research Institute.