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A RATIONAL RICE PRICE POLICY

by

Leon A. ^{ntemes} Mears, 1907-

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A Rational Rice Price Policy

One year has elapsed since mid-1969 when the Indonesian Government gave its strong support to a rice price policy with a floor price that was expected to stimulate production and with a ceiling price reasonable for the consumer and stable to facilitate development throughout the economy. During this time, related economic conditions have changed both inside and outside the country. Prices of rice have declined in the world market, relative prices have changed internally with the simplification of the multiple exchange rate structure and inflation has been constrained such that a low rate of inflation is now considered normal.

Given the year of experience in implementing the policy, and considering the specific economic changes that have taken place, is there reason to alter the general policy model or specific guidelines for policy implementation? These questions will be discussed in this paper. Experience now permits more detailed analysis of various aspects of the policy than was possible or appropriate at the time the policy was first adopted.^{1/} And, while this analysis refers specifi-

^{1/} Briefly, the rice price policy involves purchases of milled rice at the rice mill level by the Government Food Board (BULOG) to support a floor price to the farmer and injections of milled rice by BULOG in major city markets to prevent retail prices from rising above a ceiling price. In 1969/70 BULOG attempted to support the current floor price at the village level of Rp. 13.20 per kg. of lumbung-dry stalk paddy (paddy with a length of rice stalk attached at standard village rice barn moisture content of approximately 16 percent). This involved an unlimited offer by BULOG to buy milled rice at Rp. 36 per kg. ex-rice mill. Retail prices for medium quality rice were expected to be kept from rising above the ceiling price of approximately Rp. 50 per kg. by injections whenever prices rose to this level. For full explanation of the concept, see Leon Mears and Saleh Afiff, "An Operational Rice Price Policy for Indonesia", Ekonomi dan Keuangan Indonesia, Fall 1969.

cally to the Indonesian situation, it can provide guidance to other countries attempting to realize related policy objectives through buffer-stock operations.

I. Floor price to stimulate production. The year's experience has added little in the way of guidance as to the precise floor price level that would induce large scale use of modern inputs by the farmer. With major fertilizer use during the year associated with the Bimas Gotong Rojong program,^{2/} little knowledge was gained about the voluntary response of farmers facing different expected benefit/cost possibilities. Thus, there is no definite evidence as yet to support changing the assumptions that incremental benefit/cost ratios of at least 1.5 are required to overcome risks expected by the farmers so as to leave profit margins sufficiently attractive to stimulate fertilizer and other modern input use.^{3/}

As shown in Table 1, at expected incremental yields (1.48 tons

^{2/} The Bimas Gotong Rojong program was an attempt to obtain mass-intensification (BIMAS) in use of modern inputs by providing credit to the farmer in kind with repayment expected from a portion of incremental production. Foreign private contractors were involved to help finance the inputs (along with giving other forms of assistance). This program, with its credit in kind, is being replaced by one with direct bank credits and voluntary levels of participation, starting with the wet season in late 1970.

^{3/} Benefit/cost ratios as used in this paper relate the value of the total incremental benefit (from yields as estimated by the Department of Agriculture) from using the entire recommended incremental input package to the value of this package. Considering the probable production function involved, this could result in higher benefit/cost ratios but smaller absolute benefits when only a portion of the input package is utilized. Such partial use might be a general practice when farmers can select input quantities. (Partial use of the packet could also result in lower B/C ratios, depending on proportions of individual inputs used.)

TABLE 1

Incremental Benefit/Cost (B/C) Ratios
from Use of the Bimas Package under Assumptions
of Different Fertilizer Prices and Incremental Yields

Fertilizer Price in Rp. per kg.	Rp. 25	Rp. 26.6	Rp. 29	Rp. 32
<u>Incremental Yield in Tons of Stalk Paddy/ha.^{1/}</u>	<u>B/C ratios with traditional seed at 1969/70 floor price of Rp. 13.20/kg. for stalk paddy Lumbung dry at the village</u>			
1.48	1.64	1.60	1.56	1.49
1.33	1.47	1.43	1.39	1.34
	<u>at floor price of Rp. 16/kg. for stalk paddy Lumbung dry at the village</u>			
1.48	1.98	1.94	1.90	1.81
1.33	1.78	1.74	1.70	1.63
	<u>B/C ratios with high yielding seed at 1969/70 floor price of Rp. 13.20/kg. for stalk paddy Lumbung dry at the village</u>			
2.70	2.16	2.10	2.02	1.92
2.43	1.94	1.89	1.81	1.73
	<u>at floor price of Rp. 16/kg. for stalk paddy Lumbung dry at the village</u>			
2.70	2.62	2.55	2.45	2.33
2.43	2.36	2.30	2.20	2.10

^{1/} For further details, see Appendix I.

of stalk paddy/ha.) from use of the Bimas incremental input package, the incremental benefit/cost ratio (hereafter referred to as B/C ratio) would be 1.6 for traditional seed, assuming the current fertilizer guide price of Rp. 26.60 per kg. and the current floor price support level for stalk paddy lumbung dry in the village of Rp. 13.20 per kg. It is important to observe that the B/C ratio remains above 1.5 as long as the fertilizer price does not exceed Rp. 32.00/kg. for farmers whose incremental yield might be 10 percent below the expected rate (1.33 tons/ha.), B/C ratios would decline to 1.43 at fertilizer costs of Rp. 26.60/kg. and below 1.35 if these costs were as high as Rp. 32.00/kg.^{3/} Until more is known as to actual farmer response, there would appear to be reason to maintain the fertilizer/floor price relationship so as to realize B/C ratios in the range now obtainable. Whether such a B/C ratio should be realized by subsidizing the fertilizer price or by increasing the floor price warrants further consideration and will be discussed later.

Unfortunately, sufficient evidence is not yet available to know the price actually received by farmers in the village in different regions under existing support prices. Floor price support arises from the Food Board (BULOG) purchases from millers of milled rice at Rp. 36.00/kg. ex-mill or through millers of mill dry stalk paddy^{4/} at the mill at Rp. 16.00/kg. During the 1970 wet season harvest, unsystematic observations by many observers throughout Java provided reasonable evidence that such purchases by and for BULOG were main-

^{4/} Mill dry stalk paddy refers to paddy, with a length of rice stalk attached, at a moisture content of approximately 14 percent.

taining prices to the farmers at or above the Rp. 13.20 floor price. However, marketing margins may vary appreciably throughout Java. This was evidenced when the retail rice prices (medium quality) reflected at the time floor support purchases were being made were close to Rp. 35/kg. in Surabaya but at about Rp. 37.50/kg. in Jogjakarta and above Rp. 40/kg. in Semarang (ave. Rp. 41), Djakarta (Rp. 40 to 45) and Bandung (ave. Rp. 43), even though paddy prices in the village were rarely found to be much below Rp. 13.20/kg.

The Department of Agriculture is preparing to sample every two weeks the prices received by farmers at village level to provide knowledge of actual marketing margins. When this information is available, it may be found possible to raise mill buying prices (and in turn prices received by farmers) in certain areas without forcing retail prices above the expected floor price of around Rp. 42 to 43/kg. This would in turn result in increased B/C ratios for the farmers. For example, if it were possible to increase farm prices to Rp. 16/kg. of lumbung dry stalk paddy, the B/C ratio with fertilizer price at Rp. 26.60 would increase from 1.6 to 1.94 (see Table 1).

This knowledge of marketing margins is important for decision makers but they also need results of surveys that will disclose the response of farmers to various B/C possibilities from using modern inputs. Then, regionally oriented decisions would be possible. Increased benefits (in the form of increased rice production and reduced rice imports) could be compared with alternative benefits arising from lower domestic buying prices (or costs to the Government of rice distributed or injected into the market to maintain ceiling price levels). However, it must be remembered that administration

will be more complicated for a price policy that varies regionally. Also, with policies that differ regionally, undesired political costs may result.

Reference to Table 1 will show that B/C ratios to be expected from use of new high-fertilizer responsive seed are much higher than for traditional seed. At expected incremental yield levels and with fertilizer cost at Rp. 26.60/kg., the B/C ratio for the new seed is 2.1 compared to the 1.6 for traditional seed. With this much greater average potential, one would not have expected the shortfall (over 50 percent of the planned area of approximately 550,000 hectares) by farmers in planting of the improved seed during the wet season 1969/70 Bimas Gotong Rojong.

For some reason, this high potential B/C ratio proved inadequate to attract the massive adoption of high-yielding seed envisioned for the 1969/70 wet season. Assuming that the high B/C ratio should provide attractive possibilities for the average farmer, there are still reasons why the expected high rate of adoption would not have materialized. For example, where new varieties were found subject to high levels of insect or disease loss, a subsistence farmer could not risk adoption even though he expected high returns unless he could rely upon insecticide effectiveness.^{5/} A large loss could mean starvation. Also, it is known that seed multiplication has faced many shortcomings with quality and quantity constraints a distinct

^{5/} In some cases insecticides appeared to be unsuitable for the particular insect or disease and in others either insecticide or sprayers were not available when required.

possibility.

When high-yielding varieties with improved eating and milling qualities have been developed and proven suited to the Indonesian environment, intensification program concentration might then be limited to these varieties. With higher average yields, program area could be reduced and would permit greater concentration of support. Fertilizer subsidization probably could be eliminated and the floor price lowered with expected B/C ratios remaining well above 1.5.

The floor price support level is important also in relation to world prices. If the resulting price of domestic rice is higher than for imports, the opportunity cost must be evaluated of using scarce revenue funds to support the domestic price instead of buying lower cost imports. As shown in Table 2, the explicit money cost at BULOG godowns of domestic rice, at the present floor price of Rp. 36/kg., is Rp. 39.50/kg. This is slightly above the current financial cost of Asian rice (Rp. 36/kg. at \$90/ton C & F). Total social cost of domestic rice (including fertilizer subsidy) and total financial cost (including fertilizer subsidy plus Bimas production credit losses) are even further above the cost of imported Asian rice. However, financial costs are considerably lower than for imported rice purchased on long term credit from Japan (Rp. 59.80/kg.) or the United States (Rp. 73.80/kg.). But, the social cost--considering future payments at their discounted present value--of this rice from Japan and the United States is considerably below the cost to BULOG of domestic rice at the floor support price.^{6/}

^{6/} Credit terms are for 30 years for Japanese and 40 years for U.S. rice, including a 10 year grace period for both. For Food Aid rice from Japan, both social and financial costs are even lower as the only cost to Indonesia is for transportation.

TABLE 2

Financial and Social Costs of Incremental Domestic Rice Production^{1/}
Compared with Imported Rice

Floor support price for rice, ex-mill Rp./kg.	34		36		38	
Fertilizer price U.S. \$/kg. C & F	70.60	78.60	70.60	78.60	70.60	78.60
Relevant fertilizer subsidy Rp./kg. ^{2/}	6	9	6	9	6	9
<u>All prices at BULOG Godown (in Rp./kg.)</u>						
<u>Domestic Rice Production</u>						
Explicit money cost	37.50	37.50	39.50	39.50	41.50	41.50
Total social cost	39.56	40.10	41.56	42.10	43.56	44.10
Total financial cost	41.56	42.10	43.56	44.10	45.56	46.10
<u>Financial Cost at BULOG Godown of Rice Imports^{2/}</u>						
Asian rice (\$90/ton C & F)	-----Rp. 36.00/kg.-----					
Japanese rice (\$155/ton C & F)	-----Rp. 59.80/kg.-----					
U.S. PL-480 rice (\$190/ton C & F)	-----Rp. 73.80/kg.-----					

^{1/} See Appendix II for details.

^{2/} All dollar costs converted at Rp. 378/\$1.

These comparative costs suggest that alternative uses should be examined for the floor price support funds, although there are several strong reasons for priority remaining to finance floor price support for increased domestic production. First, today's world price is lower than it has been for many years. Over time, this price might be expected to average at a level equal to or somewhat above the subsidized domestic price. In the meantime, there is reason to conserve scarce foreign exchange. Supplies of both Japanese and U.S. rice cannot be expected to be highly elastic over time and might not be available in the quantities required to replace increased production expected from domestic strong floor price support. With world prices often volatile and a high political value placed on food self-sufficiency, it is unlikely that alternative uses of the support subsidy funds would provide equal social benefits.^{7/} And finally, it would be difficult to find equivalent alternative employment for agricultural workers already under-employed.

II. Ceiling Price. Traditionally, in Indonesia it has been the ceiling price upon which policy makers have concentrated attention. Low production costs and minimal political unrest have been the usual explanations. This political reason is still valid today though usually couched in terms of social regard for the poor and the desire for a stable rice price to curb development-based inflationary pressures in the balance of the economy.

^{7/} This does not mean that Indonesia should plan seriously to enter the rice export market. This is another question, requiring further study of expected world supply and demand trends as well as of Indonesia's comparative advantage.

The present rice ceiling price of Rp. 50/kg. is 25 percent above the average price level of the patjeklik (pre-harvest) season of early 1969, a time during which rice prices were generally too low to effectively stimulate increased production. However, this ceiling price is at least 20 percent lower than the relatively high average patjeklik prices of 1968. But, with the Rp. 50/kg. ceiling price, the average terms of trade between rice and the other essential goods during the patjeklik period in 1970 compared favorably with historical terms of trade in other recent years. Also, while the price of medium quality rice in Djakarta rose 30 percent between June 1969 and June 1970 (while the Cost of Living Index in Djakarta was rising only 15 percent), this differential adjustment represented merely a relative correction of the rice price from the 1969 low. On these grounds alone, there would appear to be no reason for any major change in the ceiling support price.^{8/}

At the same time, there are economic arguments for at least considering changes in either the floor or ceiling price, or both. From a financial viewpoint, a buffer stock policy to enable maintenance of floor and ceiling prices usually has a cost attached to it. This cost, including in the Indonesian case the cost of market injections and distribution of rice to the armed forces, Government employees and the State Enterprises, will result in a deficit to BULOG of approximately Rp. 4.5 billion in 1970/71 considering latest estimates of the

^{8/} It is recognized that the recent years of slow growth do not necessarily provide an appropriate period for comparing terms of trade when the objective is to stimulate growth. But, where demand already exceeds supply, it is the floor price that is important for production. Ceiling price fluctuations should be minimized to help maintain stability, while its level is a trade-off between revenue drain vs. effect on production costs.

prices and volumes of the rice activities of BULOG (see Appendix III). Following are alternative possibilities for reducing this financial cost or deficit:

1. For every Rp. 1 increase in the ceiling price, BULOG deficits decline approximately Rp. 300 million.
2. For every Rp. 1 increase in the sales price by BULOG to Government employees and armed forces, deficits decline approximately Rp. 770 million.
3. For every Rp. 1 increase in the sales price by BULOG to the State Enterprises, deficits decline approximately Rp. 180 million.
4. Decreases in world market prices of \$5/ton would reduce costs to BULOG Rp. 190 million for every 100,000 tons purchased commercially. However, as such purchases may be less than 50,000 tons during the current year, little relief can be expected from this alternative.
5. For every Rp. 1 decrease in the subsidized level of prices charged BULOG by the Government for Food Aid or long term loan purchases, BULOG deficits will decline approximately Rp. 750 million, but finance for development is reduced simultaneously by a similar amount.
6. For every Rp. 1 reduction in the ex-mill support price for domestic purchases, BULOG costs will decline approximately Rp. 465 million.
7. If handling losses by BULOG could be cut in half, costs would decline approximately Rp. 650 million.

Examination of these alternatives emphasizes the numerous inter-

relationships between floor and ceiling prices and costs to the Government of financing the program. Most of the current deficit of BULOG arises because prices charged on distributions to the armed forces, Government officials and State Enterprises do not fully cover cost (including distribution costs and overhead). If those agencies were being billed in 1970/71 at full cost, then a rise of only Rp. 3.0 in the ceiling price would enable BULOG to break even on their rice activities this fiscal year.^{9/} And, as indicated by recent Philippine experience, it is important for the continued viability of a buffer stock agency that deficits be minimized. There, with rapidly mounting deficits from buffer stock operations of the Rice and Corn Administration, strong political pressures have resulted in limiting available finance and the effectiveness of price policy implementation. Thus, in Indonesia an increase in distribution prices should be seriously considered in order to allocate costs where they belong.

An increase in the ceiling price could have another advantage (although there may be major disadvantages as well). The spread between the existing floor price (as reflected at retail level) of about Rp. 42 to 43/kg. and the ceiling price of Rp. 50/kg., allows but a 20 percent increase in price between the harvest low and patjeklik high. This barely allows adequate spread to enable efficient traders to recover costs involved and realize a small profit in holding stocks between seasons. As shown in Appendix IV, monthly costs of

^{9/} BULOG's deficit could also be reduced to the extent rice distributions can be eliminated and their value monetized as wage payments for Government employees. Is there reason for continuing distributions to PNC when buffer stocks could be used to compensate by injections for large State Enterprise purchases.

holding stocks amount to between 3.75 and 6.50 percent of their value. Efficient traders may be able to turn over stocks rapidly at harvest time and repurchase during the second crop such that average holding time of rice sold at the ceiling price would not exceed 4 months and thus allow a profit for the risk involved. If the majority of traders could not operate on this basis, they would gradually go out of business and thus force the Government or a small oligopolistic group of traders to assume a major share in holding stocks for the pre-harvest period. This is a situation that no one would desire. Traders could reduce their holding costs slightly by holding stocks in the form of paddy rather than rice but such cost reductions could not be expected to extend their economic holding time by as much as a month. Thus, the spread between floor and ceiling should be watched carefully, giving consideration to expanding it slightly if traders are observed to be reducing their inter-season storage activities.

Reduction of financial cost to the Government without changing the B/C ratio for the farmer could be effected by offsetting elimination of the fertilizer subsidy by an increase in the floor support price. Given the leverage whereby a Rp. 2.9/kg. increase in fertilizer prices is reflected in only a Rp. 1 increase in rice prices, a Rp. 2.8/kg. increase in the ex-mill support price should leave the farmer as well off even though the fertilizer price was raised Rp. 8/kg. or to approximately Rp. 35/kg. (the probable price at farm level with C & F costs of approximately \$76/ton, if the entire subsidy were removed and farmers charged full costs).^{10/}

^{10/} While the farmer would be as well off financially (i.e. the B/C ratio would remain constant), the farmer's response might be affected favorably or unfavorably by the relative fertilizer/rice price change. This requires further study. Also, the leverage effect is slightly lower

Thus, if the mill support price was increased Rp. 2.8/kg., financial costs to BULOG and the Government would increase by only Rp. 1,120 million on domestic purchases similar to 1970/71 of only approximately 400,000 tons. On the other hand, with fertilizer subsidy withdrawn, Government subsidy costs would be reduced by approximately Rp. 8/kg. on the full year's Bimas program, amounting to a savings of over Rp. 2,000 million (assuming participation at 80 percent of target). Further savings would result as removal of the subsidy would simultaneously eliminate subsidization of fertilizer used for non-Bimas rice production, for vegetable and horticulture crops as well as for fertilizer bought on the market by the estates. Even the added cost on BULOG's domestic purchases could be offset if the retail ceiling price were raised proportionately, a change that would necessarily accompany the floor price rise if increased efficiency in marketing did not allow reduction in marketing margins.

Such an increase in the ceiling price would provide added revenues from commercial imports and either added revenues or increased finance for the development budget from PL 480 and Food Aid imports. Added cost would ensue to the consumer including those paying for Government distributions (if these prices were raised proportionately). But, the increase in retail price would add only 1.7 percent to the consumer Cost of Living Index, which should be tolerable under existing conditions. It would also place domestic price levels a small additional

10/ (cont'd)

for high-fertilizer responsive varieties as fertilizer accounts for a larger percentage of their package of incremental inputs. It is also interesting to note that it is because of this leverage effect that the rumus tani (which judges profitability of fertilizer use by equating only the fertilizer and rice prices) is an inaccurate guide for fertilizer price determination. (See Appendix V for calculations.)

amount above present world prices. This latter is an advantage as long as Indonesia remains an importer but could become a disadvantage if in good crop years Indonesia produces a surplus that must be sold internationally (a problem now suffered in an extreme degree by Japan).

III. Problems of Price Policy Implementation. Implementation has been imperfect because of both technical and administrative difficulties, although problems in both areas are now understood and in many cases already are being corrected.

(1) Difficulty has arisen in selecting typical average rice varieties on which to base ceiling price action. During the patjeklik period, supplies in city markets of domestic varieties tend to disappear. Injections in those markets must be made from existing BULOG stocks with imported rice predominating. To the extent these injected varieties are not perfect substitutes, prices of the standard variety are not affected.^{11/} Thus, maintenance of ceiling price is now understood to mean maintenance of price of at least one variety of average quality rice. The price of the domestic standard variety may rise above the ceiling in its extremely restricted market during patjeklik. During this shortage period, the ceiling price is maintained for the average quality of imported rice that is injected.

(2) It has become increasingly recognized that maintenance of floor and ceiling price levels throughout the country requires a clear

^{11/} Studies made in early 1970 indicate that the foreign rice was not a perfect substitute, see for example, E. Roekasah Adiratma and Zulkifli Azzaino, The Influence of Injected Rice upon the Price Decrease of Certain Rice Qualities in Djakarta Markets, 23 January - 7 February 1970, Agricultural Marketing Section, Institute Pertanian, Bogor.

understanding of price control policies by regional as well as the central office of BULOG. Given the inherent delays involved in communication, regional offices must have standing authority to buy promptly when the ex-mill price drops to the floor support price and to inject rice immediately when retail market prices reach the ceiling level. This requires anticipatory action by Djakarta in providing clear policy guidance and arrangement for flows of funds for purchases and stocks for injections and distributions. BULOG in Djakarta has discerned a tendency on their part to be more closely attuned to price fluctuations on Java where a major portion of purchases and injections take place. They have recognized the need to explicitly focus on regions outside Java where crop seasons and the cyclical requirements for finance and buffer stocks differ from those on Java. Also, the importance has been recognized for regional offices to maintain current logistical records so they can give Djakarta advance notice when unusual finance or stock problems are expected to arise.

(3) In spite of the Central Government's policy to the contrary, inter-area restrictions remain that constrain stock movement by private traders between areas. Thus free-market adjustments of stocks and prices are restricted and the activity of BULOG is increased unnecessarily. At times, this has added difficulty in effectively implementing price policies. For example, traders in the deficit area of West Kalimantan could readily import surpluses from East Java, bringing stock and price adjustment through the free market to both regions. However, provincial export restrictions have at times prevented shipments from East Java except by BULOG. In South Sulawesi, charges are still imposed by bupati (district administrators) for movements across

kabupaten (district) borders. At times this results in excess stocks within the kabupaten that depress prices below floor price levels and thus discourage increased use of fertilizer and other high-productivity inputs.

(4) Areas also remain, such as in West Sumatra, where shortage of milling and storage capacity continues to depress prices of bumper-sized crops and will tend to restrict production increases unless the surplus can be appropriately handled.

(5) Finally, customary practices are only gradually discarded. Where past BULOG emphasis has been on maintaining surpluses to insure distribution to the armed forces, etc., it is at times difficult to obtain agreement to use surpluses for market injections to support ceiling prices until these surpluses are in excess of 2 or 3 month's distribution requirements. It takes time to create confidence that central planning can provide for adequate stock movements such that future distributions will not be threatened if current surpluses are injected into the market.

IV. Conclusion. During the first year of the new Government Rice Price Policy, implementation has met with minor difficulties but ceiling prices generally were not exceeded during the 1969/70 patjeklik and floor prices--at least on Java--were maintained during the wet season harvest in 1970. In most cases, action has already been initiated to correct shortcomings faced during the first year.

Price levels supported during this year appear to remain reasonably suitable, at least for the coming year. Regional refinements may be possible by floor price adjustments but await more specific reporting of prices received by farmers. These adjustments may involve decisions

as to whether to provide greater inducement to the farmers with higher floor prices, or to reduce program costs by lowering regional buying prices.

There may be reason to increase the spread between ceiling and floor price if evidence develops that traders are provided inadequate margins to carry stocks between harvest and patjeklik. Even this adjustment might be varied regionally.

Potential BULOG losses can be eliminated in large part by charging the budgets of armed services, Government employees, and State Enterprises full cost for rice distributions. Even so, the price support activities of BULOG may at times be expected to operate at a slight loss, a cost that can be justified by the services rendered in implementing the price policy.

Serious consideration should be given to the possible advantages from removing the fertilizer subsidy entirely and compensating by a small increase in the level of support prices. Financial savings will ensue for the Government with nominal costs being transferred to individual consumers. If this transfer is acceptable politically, the Government revenues stand to benefit.

Leon A. Mears

APPENDIX I

Basis for Calculation of Incremental Benefit/Cost (B/C)
Ratios shown in Table 1

1. Incremental Input Package per Hectare (prices in Rp.)

Fertilizer price at farm (Rp./kg.)	Yield	Traditional Seed	High Fertilizer-responsive Seed
	25	26,6	29
	25	26,6	29
Insecticide 2 liters	2,350	2,350	2,350
Zincphosphide 100 grams	45	45	45
Share of sprayer cost	600	600	600
Seed	25	25	25
Additional intensification costs	3,500	3,500	3,500
Fertilizer: Urea 100 kg.	2,500	2,660	2,900
TSP 35 kg.	875	931	1,015
Total loan value	9,870	10,086	10,310
Interest, 1%/mo. for 7 months	691	706	721
Total incremental costs (Rp.)	10,561	10,792	11,031
			11,573
			200 kg.
			45 kg.
			5,000
			1,128
			13,623
			954
			14,577
			5,320
			1,197
			14,012
			981
			14,993
			5,800
			1,305
			14,600
			1,022
			15,622
			6,400
			1,440
			15,335
			1,073
			16,408

2. Incremental Net Benefits per Hectare (assuming 1/6 of crop paid to harvesters)

Yield	Net Incremental Benefits	Yield	Net Incremental Benefits
Mill - dry Stalk Paddy at the Village (tons/ha.) ^{a/}	Traditional Seed	Mill - dry Stalk Paddy at the Village (tons/ha.) ^{a/}	High Fertilizer- responsive Seed
1.48	Rp. 17,270	2.70	Rp. 31,500
1.33	15,500	2.43	28,350
1.48	20,950	2.70	38,250
1.33	18,820	2.43	34,400

Mill-dry paddy price to farmer
Rp. 14/kg.^{b/}

Mill-dry paddy price to farmer
Rp. 17/kg.^{b/}

a/ Incremental yields as estimated by Department of Agriculture but which may not be exactly correct for farmer's fields. If only portion of input packet is used, yields will vary and B/C ratio might be higher or lower depending on particular inputs selected and resulting production function.

APPENDIX I
(cont'd)

3. $B/C \text{ ratio} = \frac{\text{Net incremental benefits}}{\text{Total incremental costs}}$

4. Note: B/C ratio assumes all owner-operators. If farmers are tenants, their B/C ratio depends upon relative sharing of costs and benefits with landlords.

b/ Mill-dry stalk paddy prices at the village of Rp. 14/kg. and Rp. 17/kg. are approximately equivalent to prices of stalk paddy lumbung dry at the village of Rp. 13.20/kg. and Rp. 16/kg. respectively.

APPENDIX II

Basis for Calculation of Financial and Social
Costs of Incremental Domestic Rice Production

1. Cost of Average Quality Imported Milled Rice (\$ cost
converted at 380/1)

	Asian (Thai 25% Broken)	U.S. (P.L. 480)	Japan Soft Loan
C & F Cost (U.S. \$/ton)	90.00	190.00	153.00
C & F Cost (Rp./kg.)	34.00	71.80	57.80
Added cost to BULOG Godown	2.00	2.00	2.00
Cost at BULOG Godown (Rp./kg.)	36.00	73.80	59.80

2. Cost at BULOG Godown at Various Floor Support Prices (Rp./kg.)
of Milled Rice Produced Domestically

<u>Support Price, Ex-Rice Mill</u>	34.00	36.00	38.00
Provincial premium ^{a/}	0.50	0.50	0.50
Transport to BULOG Godown	1.50	1.50	1.50
Gummy sack	1.50	1.50	1.50
<u>Explicit Money Cost at BULOG Godown</u>	<u>37.50</u>	<u>39.50</u>	<u>41.50</u>
Fertilizer subsidy (Rp.9/kg. fertilizer) ^{b/}	1.60	1.60	1.60
Department of Agriculture program costs ^{c/}	1.00	1.00	1.00
<u>Total Social Cost at BULOG Godown</u>	<u>40.10</u>	<u>42.10</u>	<u>44.10</u>
Credit loss on program ^{c/}	2.00	2.00	2.00
<u>Total Financial Cost at BULOG Godown</u>	<u>42.10</u>	<u>44.10</u>	<u>46.10</u>

APPENDIX II
(cont'd)

a/ Add Rp. 0.50/kg. to premium on purchases outside Java.

b/ Calculation of Fertilizer Subsidy in Terms of Milled Rice
Assuming other inputs constant at full Bimas package level:

For traditional seed:

135 kg. fertilizer yields 1.48 tons incremental mill-dry stalk paddy or $1.48 \times .52 = 0.77$ tons milled rice

So 1 ton milled rice requires $\frac{135}{.77} = 177$ kg. fertilizer and fertilizer subsidy of Rp. $\frac{9}{.77}$ kg. =

$$\frac{9 \times 177}{1,000} = \text{Rp. } 1.60/\text{kg. of milled rice}$$

$$\text{and at subsidy of Rp. } \frac{6 \times 177}{1,000} = \text{Rp. } 1.06/\text{kg. of milled rice}$$

For high-yielding seed: deduct Rp. 0.02 from above

c/ Estimate of Departmental Cost/kg. of Incremental Yield

Estimate of Department expenditures to support program in 1970/71 = Rp. 1.5 billion

Estimate of incremental yield of milled rice:

for traditional seed 976,000 ha. x 1,480 kg./ha. x 0.52 = 750 million kg. of milled rice

for high-yielding seed 806,000 ha. x 2,700 kg./ha. x 0.52 = 1,130 million kg. of milled rice

So at 80% participation in program:

$$\text{Departmental Cost/kg.} = \frac{1.5}{1.88 \times .80} = \text{Rp. } 1.0/\text{kg. of milled rice}$$

d/ Estimate of Credit Loss on Bimas Program Loans

Total loan value if 80% participation in Bimas:

Traditional seed area:

$$976,000 \text{ ha. @ Rp. } 10,000/\text{ha.} \times 0.80 = 7.8 \text{ billion}$$

High-yielding seed area:

$$750,000 \text{ ha. @ Rp. } 14,000/\text{ha.} \times 0.80 = 8.4 \text{ billion}$$

Total loan value, approx. 16.0 billion

Assuming a 20% loss on loans:

$$\text{Total loss} = 0.20 \times 16 = \text{Rp. } 3.2 \text{ billion}$$

Then loss per kg. of incremental milled rice

$$\text{production} = \frac{\text{Rp. } 3.2 \text{ billion}}{1.88 \text{ billion kg.} \times 0.80} = \text{approx. Rp. } 2/\text{kg.}$$

APPENDIX III

Estimate of BULOG Deficit for 1970/71

1. Estimate of Financial Deficit to Bulog for Rice Activities 1970/71.

Distributions:

Armed forces and Government officials		
769,000 tons @ Rp. 45/kg.	=	Rp. 34.6 billion
State enterprises		
180,000 tons @ Rp. 46.5/kg.	=	8.4 "
Market injections		
311,000 tons @ Rp. 46.5/kg.	=	14.4 "
<u>Total sales</u>		<u>Rp. 57.4 billion</u>

Cost of BULOG sales and operations:

Domestic procurement		
465,000 tons @ Rp. 39.5/kg.	=	Rp. 18.4 billion
PL-480, soft loan and fcod aid		
750,000 tons @ Rp. 40.0/kg.	=	30.0 "
Commercial imports		
45,000 tons @ Rp. 36.0/kg.	=	1.6 "
Overhead	=	9.9 "
Stock losses of 2.6% of sales		
1,260,000,000 kg @ Rp. 39.7/kg. x .026	=	1.3 "
<u>Total costs</u>		<u>Rp. 61.2 billion</u>
<u>Deficit = Sales - Costs</u>		<u>Rp. 3.8 billion</u>
or Rp. 3.0/kg. sold		

APPENDIX IV

Basis for Estimating Costs of Holding Paddy or Rice

$$C = i + r + l + s$$

where C = cost of holding paddy or rice, in percent of value, per month.

i = insurance cost in percent of value, per month.

r = rate of interest per month for financing.

l = losses in storage per month, in percent of value.

s = cost of storage, in percent of value per month.

Values have been estimated as follows:

i = 0.01% per month

r = 2.25 to 5.0% per month (This may be cumulative, calculated each month on outstanding balance)

l = 0.5% per month

s = 1.0% per month

C = 3.76 to 6.51% per month

APPENDIX V

Increase Required in Floor Support Price (Milled Rice Ex-Mill)
so Farmers B/C Ratio from Using Bimas Inputs
will Remain Constant if Fertilizer Subsidy Withdrawn

To hold B/C constant requires that $(B/C)_1 = (B/C)_2$

where $(B/C)_1 = B/C$ from existing floor price of Rp. 14/kg.
(P_1) for Mill-dry stalk paddy at the village,
with fertilizer subsidy averaging Rp. 8.0/kg.
(Equivalent to the subsidy required if C & F
price of fertilizer = \$76/ton)^{A/}

$(B/C)_2 = B/C$ from new floor price (P_2) with fertilizer
subsidy removed

$$\text{and } B/C = \frac{S \cdot Y \cdot P}{(C + Q_f \cdot P_f) \cdot (1 + i)}$$

where $S =$ share of incremental yield received by farmer =
5/6

$Y =$ incremental yield in kg. of Mill-dry stalk
paddy at the village

$P =$ floor price in Rp./kg of Mill-dry stalk
paddy at the village

$C =$ cost in Rp. of Bimas package, excluding ferti-
lizer

$Q_f =$ quantity of fertilizer used in kg.

$P_f =$ price of fertilizer to farmer in Rp./kg.

$i =$ interest on loan at 1% per month for 7 months

Then, for traditional seed:

$$\frac{B}{C} = \frac{5/6 \times 1,480 \times 14.00}{(6,495 + 135 \times 26.6) \cdot 1.07} = \frac{5/6 \times 1,480 P_2}{(6,495 + 135 \times 34.6) \cdot 1.07}$$

and $P_2 = \frac{11,166}{10,090} \times 14 = \text{Rp. } 15.48$ (equivalent to Rp. 17.50/kg.
Mill-dry at the mill)

and Milled rice price ex-mill = $\frac{17.50}{.52} +$ milling and other
costs (Rp. 5.20)
= Rp. 38.8/kg.

$$\text{Leverage} = \frac{\text{Change in fertilizer price}}{\text{Change in milled rice price}} = \frac{8}{2.8} = 2.85/1$$

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APPENDIX V
(cont'd)

And, for high-yielding seed

$$\frac{B}{C} = \frac{5/6 \times 2,700 \times 14.00}{(7,495 + 245 \times 26.6) 1.07} = \frac{5/6 \times 2,700 P_2}{(7,495 + 245 \times 34.6) 1.07}$$

and $P_2 = \frac{15,972}{14,012} \times 14 = \text{Rp. } 15.97$ (equivalent to Rp 18.00/kg.
Mill-dry at the mill)

and Milled rice price ex-mill = $\frac{18.00}{.52} + 5.20 = \text{Rp. } 39.8/\text{kg.}$

(Note: The B/C ratio on the high-yielding varieties will decline slightly if the new floor price of Rp. 15.5 for mill-dry stalk paddy at the village (as calculated for traditional seed) is used. This is of no practical consequence as B/C ratios for high-yielding seed are already exceedingly high (see Table 1).

a/ Fertilizer is subsidized in mid-1970 for the amount that the C & F price exceeds \$54.93/ton.